

Tighe&Bond

Old Amherst Landfill
Old Belchertown Road
Amherst, Massachusetts

**Final Comprehensive
Site Assessment
(FCSA) Report
Volume 2 of 2**

Prepared For:

**Department of Public Works
Amherst, Massachusetts**

January 2009

HEALTH & SAFETY PLAN

**Old Amherst Landfill
Route 9 (South Side)
Amherst, Massachusetts**

*Prepared for:
Town of Amherst
Department of Public Works
Amherst, Massachusetts*

August 2005

HEALTH AND SAFETY PLAN FOR ROUTINE SITE ACTIVITIES

1.0 Purpose - The purpose of this health and safety plan (HSP) is to provide standards for worker safety and protection during field activities conducted on a frequent or routine basis. The plan outlines standards and mandatory procedures relative to physical and chemical hazards encountered at sites, communication, training, worker health monitoring, decontamination procedures and levels of personnel protection. Any questions concerning this information should be directed to Tighe & Bond Certified Industrial Hygienist, Mr. Michael J. Matilainen at 413-562-1600.

2.0 Applicability - This plan is applicable to all personnel working at sites where mandatory worker health and safety training is required by State or Federal agencies. It is intended for use at sites where information regarding potential site hazards is available in the form of background research, personal communication with past or present property owners or workers, previous sampling results, etc.

Available information should be provided to site workers as outlined in Section 5. This plan is applicable only when provided in conjunction with a site specific hazard evaluation summary including information outlined in that Section.

Activities to which this plan is applicable may include sampling of groundwater, wastewater and ambient air; inspection of drilling, excavation or construction activities; and other routine field activities. Activities involving contact with unknown substances and activities on sites where little background information is available will require more extensive and specific HSP development.

This plan does not cover procedures for entry into trenches, excavations or confined spaces. Project-specific attachments should be prepared and appended to the site hazard evaluation summary if those activities are planned. Work of this nature shall be performed in accordance with 29 CFR 1926.250 subpart P "Excavation, Trenching and Shoring", 29 CFR 1910.146 "Permit Required Confined Space Entry" and the Tighe & Bond "Employee Confined Space Entry Program".

3.0 Site Control - Work Zones - It is not anticipated that conditions on sites where this plan is applicable will require special measures to achieve site security or restriction of normal site activities and access. If special site control measures are necessary at individual sites, those measures must be outlined in the site specific hazard summary to be prepared for each site. Whenever possible, efforts should be made to minimize potential exposures at the sites. These can include but are not limited to remote sampling/materials handling, positioning workers upwind of work activities and rotation of employees.

1/15/2009

4.0 Personnel Protection - Personnel protective equipment and safety requirements must be appropriate to protect against the known or worst potential hazards on the site. Protective equipment should be selected based on the concentrations and possible routes of exposure to known or potential worst case substances. The levels of personnel protective equipment are described in Section 8. All Tighe & Bond engineering or assessment personnel engaged in work on-site will be participants in the Tighe & Bond medical monitoring program described in Section 9, or a similar program.

It is anticipated that Level D or C protection and basic site safety measures will be sufficient at most sites. Any conditions warranting upgrading the required level of protection to Level B or A will be cause for all personnel to immediately leave the work site. The site will be re-evaluated and a new site health and safety plan will be prepared which incorporates the additional site information.

Whenever Level C is in use, the breathing zone of the workers will also be monitored constantly utilizing a photo-ionization detector (PID). If the total volatile organic concentration (as indicated by the PID) in the breathing zone of the workers approaches 50 ppm, work shall cease and the crew will exit the work area and evaluate the need to upgrade to Level B.

The specific respiratory protective device selected for Level C protection shall be the device identified on each individual's respirator fit test, as described in Section 5.3. In general, respirators will be supplied with combination cartridges for organic vapors, dusts, mists, and acid gasses and shall be approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health. In the event that a site hazard evaluation summary identifies the potential for exposure to other chemical substances (i.e. formaldehyde, Ammonia) additional cartridges will be supplied as necessary to be made available at the site.

5.0 Communications and Training - Workers at State and Federally listed or recognized sites must be provided with adequate information and training to recognize and evaluate potential hazards. Training shall comply with applicable regulations including 29 CFR 1910.1200 "Hazard Communication Standard"

5.1 Communication - The Project Manager shall supply all on-site personnel with a site-specific hazard evaluation summary to be used in conjunction with this plan.

The summary shall cover, at a minimum, the following topics:

- a. A brief description of the history of the location with regards to health and environmental hazards.
- b. A description of the activities to which the hazard evaluation summary is applicable to.

- c. A description of any hazards which may be encountered, including:
 - 1. Physical Hazards - terrain, traffic, equipment, severe weather (heat stress and frostbite), electrical hazards, noise.
 - 2. Chemical Hazards - materials used and stored at the site, materials released at the site.
 - 3. Biological Hazards - insects, plants, animals, pathogens, infectious materials.
- d. A description of the levels of protection selected for the operation.
- e. Equipment decontamination procedure if different from those specified herein.
- f. Summary of emergency contacts for use in the event of fire, explosion, medical emergency or other emergency, including the location of the nearest telephone and an address and phone number to provide to emergency personnel.
- g. A map showing the route to the nearest hospital.
- h. A summary of available recent monitoring data and relevant chemical information.

5.2 Health and Safety Training - All personnel will be provided with approved health and safety training as outlined in 29 CFR 1910.120(e). Copies of current training documentation for all site workers will be available at the site. Documentation for Tighe & Bond employees should also be maintained at a central location at the Tighe & Bond office.

5.3 Respirator Usage Training and Fit Testing - Prior to assignment to a site where respirator use may be required, employees will be provided with respirator training as outlined in 29 CFR 1910.134(e)(5). Respirator fit tests are to be conducted at 6 to 10 month intervals, or at any time when a condition that may change the fit of a respirator has occurred, such as change in weight, change in facial structure, extensive dental work, etc. All use of respirators shall comply with Tighe & Bond's written respiratory program.

6.0 Decontamination Procedures

6.1 Personnel Decontamination - If Level D protection is used, any disposable inner gloves or protective clothing should be sealed in a plastic bag and properly disposed of. Moisture resistant outer gloves and outer boots should be rinsed to remove gross contaminants, and then sealed in a plastic bag. Any further decontamination required should be performed at the laboratory. Disposable equipment should be used whenever possible.

If Level C or greater protection is used, personnel are required to follow the decontamination procedures listed below, as they apply to the gear being worn:

- a) Wash boots thoroughly with clean water or an appropriate cleaning solution to remove gross contaminants.
- b) Scrub down outer boots in decontamination solution and rinse with water.
- c) Remove boots.
- d) If wearing reusable raingear, it should be cleaned in a similar manner as the boots.
- e) Disposable Tyveks should be removed and placed in trash receptacle.
- f) Spent cartridges can also be discarded in the trash receptacle.
- g) Remove outer gloves and wash in same manner as boots while wearing disposable inner gloves.
- h) Use a new set of disposable gloves to clean additional equipment including hard hat, safety glasses, etc.
- i) Decontamination wash and rinse water will be allowed to percolate into the ground or as specified.

6.2 Equipment Decontamination - Proper decontamination of all equipment is necessary to avoid transferring contaminants from the site, thereby increasing potential for exposure of on-site and off-site personnel. The measures described below should be followed prior to leaving all sites, as applicable to the equipment being used. Any variations from the procedures described below for reasons of worker health or safety must be described by the Project Manager in the site specific hazard summary.

These measures are separate from, and may not be substituted for, other decontamination procedures associated with proper sampling protocol

- a) Sampling equipment such as measuring tapes and bailer cords may be decontaminated at the sampling area. The equipment may be thoroughly rinsed with clean water or an appropriate cleaning solution and wiped dry with paper towels before leaving the work site. Alternatively, they may be wrapped in absorbent material and/or stored in plastic bags sealed to prevent contact with workers, vehicles, etc.
- b) The rinse water from this operation will be allowed to percolate into the ground or as specified.
- c) Decontamination of drilling equipment including drill rigs, backhoes, drill rods, augers, etc. will take place at the site of each boring/monitoring well or test pit prior to moving to subsequent locations. Decontamination of such equipment will entail a thorough steam cleaning, or washing and rinsing of the equipment with high pressure water followed by air drying. In addition, the tires and undercarriages of vehicles exiting areas identified as having surficial hazardous materials will be sprayed with high pressure water and allowed to dry before leaving the contaminated area.
- d) Contaminated soil brought to the surface during any well installation or soil excavation activities with a total organic vapor concentration (TOV) greater than 10 ppm as registered by the field PID will be segregated into an area lined with 6 mil (minimum) polyethylene. The piles will be surrounded by an earth berm, and will be covered with 6 mil (minimum) polyethylene pending proper disposal or reuse.

7.0 Emergency Procedures

7.1 Inhalation

- a) If warning signals such as: dizziness, nausea, headache, shortness of breath, burning sensation in mouth, throat or lung or symptoms specific to hazard found at the site are apparent, the victim should leave the contaminated air space immediately. Have someone contact emergency services and obtain health and safety information about potential contaminants.
- b) If unconscious, the victim should be pulled out of the contaminated area immediately if they do not have any injuries, which would prohibit moving them (i.e. spiral injury). The rescuers should make sure that the area is safe to enter. If the area cannot be safely entered, attempt to ventilate this

area. Do not attempt a rescue. Rescuers should make sure they are properly trained in First Aid and rescue and that they are wearing proper respiratory and protective equipment before attempting the rescue.

- c) If the victim is no longer breathing, mouth-to-mouth resuscitation or some other form of artificial respiration should administered by a person who is properly trained and certified in a location away from the contaminated area.

Medical attention should be obtained as soon as possible.

7.2 Skin Exposure - The skin should be washed with copious amounts of soap and water. If clothing is contaminated, it should be removed immediately and the skin washed thoroughly with running water. If a shower is available, it should be used immediately and clothes should be removed while showering. This procedure may be life-saving as certain highly toxic chemicals are rapidly absorbed through the skin.

All contaminated parts of the body, including the hair, should be thoroughly decontaminated. It may be necessary to wash repeatedly.

7.3 Ingestion - A poison control center or emergency service should be contacted immediately to determine an appropriate course of action. If possible, have health and safety information on the poison available when you call for help. Vomiting should be induced except when the substance presents an aspiration hazard, such as from a petroleum product; or when the substance is strong acid or alkali. To induce vomiting, a tablespoon of salt or powdered mustard in a glass of warm water or syrup of ipecac from the First Aid Kit can be taken as an emetic.

Drinking plenty of water and placing a finger down the throat may also be effective in inducing vomiting. The treatment should be repeated until vomit is clear.

Medical attention should be obtained immediately.

7.4 Eyes - If a toxicant should get in the eyes, they should be washed with plenty of water. The eye itself should be held open, rotated, and flooded with water so that all surfaces are washed thoroughly. Washing should be continued for at least 15 minutes.

Medical attention should be obtained immediately.

7.5 Exposure to Heat or Cold - When working under severe weather conditions, personnel should be aware of the signs of heat stress, hypothermia and frostbite as well as the appropriate response actions.

- a) Heat Stress - If a worker shows signs of heat stroke (dry, hot, red skin, high body temperature) or heat exhaustion (cool, moist, pale or red skin, dilated pupils, nausea, dizziness), the worker must be removed from the work area and cooled. Loosen clothing, elevate feet, and provide cool liquids. Heat stroke can be life threatening and requires rapid action.
- b) Hypothermia - If a worker shows signs of hypothermia (shivering, impaired judgement, drowsiness, clumsiness) the worker must be removed from the work area and warmed gradually.
- c) Frostbite - If a worker shows signs of frostbite (skin color changes to white or grayish-yellow then grayish-blue), the worker must be moved to a warm place. The affected area should be placed in warm (100-105°F) water. Do not rub or massage.

7.6 Stings and Bites - If still present, remove stinger with fingernail. Work the site with soap and water. Cover with bandage and apply ice. If severe allergic reactions appear (hives, itching, rash, nausea, vomiting, dizziness, swelling) seek medical attention immediately.

8.0 Levels of Protection - While this plan is not intended for use at sites where levels of protection above Level C are required, all four Levels (A through D) are described below. Workers should leave the site pending further evaluation if conditions requiring Level A or Level B protection are observed or detected.

8.1 Level A - Level A protection should be worn when the highest available level of respiratory, skin, and eye contact protection is needed. While Level A provides the maximum available protection, it does not protect against all possible airborne or splash hazards. For example, suit material may be rapidly permeable to certain chemicals in high air concentrations or heavy splashes.

A. Personnel Protection Equipment

- Positive pressure self-contained breathing apparatus (SCBA), OSHA\NIOSH approved, operated in the positive pressure mode.
- Totally encapsulated suit (boots and gloves attached).
- Gloves - inner (tight-fitting and chemical-resistant).

- Boots - chemical-protective, steel toe and shank. Depending on suit boot construction, worn over suit boot.
- Gloves - outer, chemical-resistant. Depending on suit construction, worn over suit gloves. May be replaced with tight-fitting, chemical-resistant gloves worn inside suit gloves.
- Underwear - cotton, "long-john" type (optional).
- Hard hat (under suit).
- Disposable protective suit, gloves and boots. Worn under or over encapsulating suit.
- Coveralls (under suit).
- 2-way radio communications.

B. Criteria for Use

Use Level A:

1. When the type(s) and concentrations(s) of toxic substances are known to require the highest level of combined protection to the respiratory tract, skin, and eyes. These conditions would be:
 - a) Atmospheres which are "immediately dangerous for life and health" (IDLH). IDLH's are detailed in the NIOSH/OSHA's "Pocket Guide to Chemical Hazards" and/or other references.
 - b) Known atmosphere or potential situations that would affect the skin or eyes, or could be absorbed into the body through these surfaces in toxic quantities.
 - Potential situations are those where vapors may be generated or splashing may occur through site activities.
 - Standard reference books should be consulted to obtain concentrations hazards to skin, eyes, or mucous membranes.

- Oxygen deficient atmospheres with above conditions.
2. At sites where the type(s) and/or potential concentration(s) of toxic substances are unknown.
 - a) Unless there is information available to strongly indicate otherwise, the site should be presumed to present hazards to the respiratory system, skin, and eyes. Level A protection would provide the highest level of protection for the initial entry team.
 - b) Enclosed areas such as building, railroad cars, ship holds, etc.
 3. When total vapor readings of 500 ppm to 1,000 ppm are obtained on instruments such as a photo-ionization detector (PID) or organic vapor analyzer (OVA) in the breathing zone.

It is not anticipated that work will be done under conditions requiring Level A protection. If such conditions are encountered, operations will cease immediately and all personnel will immediately leave the area. Workers shall not re-enter the area until a more comprehensive HSP specifically appropriate for such conditions has been prepared, or until there is clear evidence that the conditions requiring Level A protection have abated.

8.2 Level B - Level B protection should be selected when the highest level of respiratory protection is needed, but exposure to the small unprotected areas of the body (i.e. neck and back of head) is unlikely, or where concentrations are known to be within acceptable exposure standards.

A. Personnel Protective Equipment

- Positive pressure SCBA, OSHA/NIOSH approved, operated in the positive pressure mode.
- Hooded, two-piece chemical-resistant suit.
- Gloves - outer, chemical-protective.
- Boots - outer (chemical-protective, steel toe and shank).
- 2-way radio communications.

- Hard hat.
- Face shield (optional).

B. Criteria for Use

Use Level B

1. When the type(s) and concentration(s) of hazardous substances are known to require the highest degree of respiratory protection; but a lower level of skin protection, i.e. in
 - a) Atmospheres which are "immediately dangerous for life and health" (IDLH). Type(s) and concentration(s) of vapors in air do not present a hazard to the small, unprotected areas of the body.
 - b) Atmospheres with concentrations of known substances greater than protection factors associated with full-face, "air purifying" respirators with appropriate cartridges.
 - c) Atmospheres with less than 19.5 percent oxygen.
2. When a determination is made that potential exposure to the body parts not protected by a fully encapsulated suit (primarily neck, ears, etc.) is highly unlikely.
3. Total vapor levels range from 50 ppm-500 ppm on instruments such as a photo-ionization detector or organic vapor analyzer and the atmosphere does not contain suspected high levels of toxic substances affecting skin or eyes.
4. Normal drilling and sampling operations will cease if conditions are such that Level B protection would be required.

8.3 Level C - Level C protection should be selected when the types and concentrations of respirable materials are known, have adequate warning properties, or are reasonably assumed to be not greater than the protection factors associated with air-purifying respirators; and exposure to the few unprotected areas of the body (i.e., neck and back of head) is unlikely to cause harm. Continuous monitoring of site and/or individuals should be established.

A. Personnel Protective Equipment

- Half-face, or full-face, air-purifying respirator (OSHA/NIOSH approved).
- Chemical-resistant outer clothing.
- Gloves - inner (tight-fitting, chemical-resistant type or woven liners).
- Gloves -outer (chemical resistant).
- Hard hat (face shield optional).
- Boots - outer (chemical-protective).
- Safety glasses.

B. Criteria for Use

1. Site known to contain potentially hazardous materials resulting in air concentrations requiring a protection factor afforded by a full-face or half-face, air-purifying respirator (OSHA/NIOSH approved).
2. Well-documented, reliable history of site and patterns of prior entry.
3. No evidence to suspect acute or chronic toxicity to exposed skin.
4. Total vapor reading between 0 ppm and 50 ppm on instruments such as the photo-ionization detector or organic vapor analyzer.

Continuous air or personnel monitoring should occur while wearing Level C protection.

8.4 Level D - Level D is the basic work uniform and should be worn for all site operations. Level D should be selected when performing environmental sampling involving dilute concentrations of contaminants on sites that have been characterized by previous analyses or research.

A. Personnel Protective Equipment

- Standard work clothing.

- Optional disposable chemical-resistant clothing appropriate for known or expected levels of contamination.
- Boots/Shoes - safety or chemical-resistant boots.
- Safety glasses or safety goggles available.
- Gloves - disposable latex or cotton.
- Optional moisture resistant outer gloves.
- Hard hat available for drilling operations.

B. Criteria for Use

1. No indication of airborne health hazards present.
2. No gross indication above background on the photo-ionization detector and/or organic vapor analyzer.

9.0 Medical Monitoring - All engineering and assessment personnel engaged in on-site activities shall be participants in a medical monitoring program similar to the following. As participants in this program, these individuals will have had recent physical examinations.

The primary goal of this medical monitoring program is to provide evaluation and ongoing surveillance of the health status of employees potentially exposed to toxic substances as a result of their work-related activities. An active health monitoring program for those employees potentially at risk is an important tool in evaluating the effects of chronic low-level exposures or acute exposures related to operations at hazardous waste sites. The effects of low-level exposures may not become apparent until years after the initial exposure.

This medical monitoring program includes laboratory testing, personnel medical history evaluation, physical examination, and specific systematic testing.

Each participant in this medical monitoring program undergoes a complete occupational history evaluation, and baseline physical examination including the following parameters:

- Pulmonary Function Studies
- Complete Blood Count
- Chemical Blood Profile

- Urinalysis
- Chest X-Ray
- Electrocardiogram
- Specific parameters as necessary dependent upon exposure.

Following the establishment of each participant's baseline values for the above parameters, an annual re-evaluation is conducted to monitor potential changes due to work with hazardous materials.

In addition to this annual re-examination, provisions are made for specific post-exposure examinations in the event of a suspected exposure during a particular field event.

The program shall meet or exceed the minimum requirements established in OSHA standard 20 CFR 1910.120.

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1/15/2009

SITE HAZARD EVALUATION SUMMARY{PRIVATE }

Brief Location History: Old Amherst Landfill –

The landfill consists of three waste disposal areas, a municipal solid waste disposal area, a concrete and masonry demolition disposal area and a wood a stump dump area. The waste disposal areas were closed and capped in 1986 using a variable depth clay soil barrier sytem.

Field activities to be conducted under this HASP include site walks, soil and sediment soil sample collection, boring and monitoring well installation, survey, and other activities associated with the new Massachusetts Department of Environmental Protection regulations associated with landfill closure.

Applicable Activities: This Site Hazard Evaluation Summary (SHES) is applicable to Tighe & Bond field personnel engaged in the excavation of soil, subsurface exploration activities and the collection of environmental samples. All other site personnel should follow their company specific Health & Safety Plan.

A. PHYSICAL HAZARDS

1. Terrain –The areas of the proposed work may be variable in elevation and terrain as associated with the current landfill cap. The area is covered with various media, including grass and vegetation, soils, clay, gravel, etc.
2. Traffic – The site is gated from Route 9. The only vehicles present inside the fencing will be involved with landfill activities.
3. Equipment - Exercise appropriate caution when working near excavation and/or drilling equipment and trucks. Avoid standing directly behind the machines and vehicles.
4. Other – The subsurface may contains utility lines. Extreme caution should be utilized during excavation.

B. CHEMICAL HAZARDS

1. Materials Used/Stored at Site – Materials buried on the site may contain various concentrations of hazardous materials. .
2. Materials Released at Site – Elevated levels of landfill gas, VOC's and metals have been identified in various media on site.

C. BIOLOGICAL HAZARDS - (insects, animals, poisonous plants, pathogens/infectious materials, etc. describe if anticipated) Insects and Poison Ivy may be present during the spring and summer months.

Level of Protection – Procedures for operating within the landfill are consistent with Level D, and may include hardhat, steel toed boots, eye wear, safety vests, or gloves.

Equipment Decontamination - Wash sampling equipment with a detergent soap in between sampling. All other applicable decontamination procedures as specified within the Contractor Health & Safety Plan should be followed.

SUMMARY OF EMERGENCY CONTACTS

Telephone Availability

X Available in employee vehicle

_____ Nearest location to be determined upon arrival on site

Town of Amherst

Fire Department

911

(Call in the event of chemical release,
fire or explosion)

Police Department

911

(Call in the event of explosion)

Ambulance

911

(Call in the event of physical injury,
heat stress, frostbite, chemical exposure)

Attach map showing route to nearest hospital

Name: **Cooley Dickenson Hospital**
30 Locust Street (Route 9)
Northampton, MA, 01061-5001
1-413-582-2108

Massachusetts Poison Control Center

1-800-682-9211

(Call in the event of poisoning by
ingestion, inhalation, etc.)

Be prepared to provide emergency personnel with the following:

- Phone number at site: (Employee Cell Phone – to be determined upon arrival on-site)
- Address of site: Route 9
- Nearest cross road: South Side of Rte 9, near Harkness Road
- Hazard exposed to:
- Any vital signs (pulse, breathing, etc.)

Other applicable emergency contacts:

1. Tighe & Bond: Jeffrey Thelan , (413)-572-3260
2. Tighe & Bond: Matt Abraham (508) 471-9602
3. DEP: Western Regional Office (413) 784-1100

DOCUMENTATION{PRIVATE }

INSTRUCTIONS: Field personnel are required to receive a copy of the health and safety plan (HSP), and to read, understand, and agree to the provisions of the plan. The Project Manager (PM) is responsible for distributing the HSP to personnel as they are assigned to the project. Personnel are required to sign this form indicating receipt of the HSP. The original of this form is maintained by the PM, and becomes part of the permanent project files. Copies of this form are to be sent to Michael J. Matalainen, CIH.

SITE NAME: Massachusetts Electric Company – Groton Street Substation

LOCATION: Groton Street, Pepperell, Massachusetts

I have received a copy, read, understood, and agree to comply with the provisions of the above referenced HSP for work activities on this project.

[illegible]

HOSPITAL DIRECTION SHEET

Cooley Dickenson Hospital

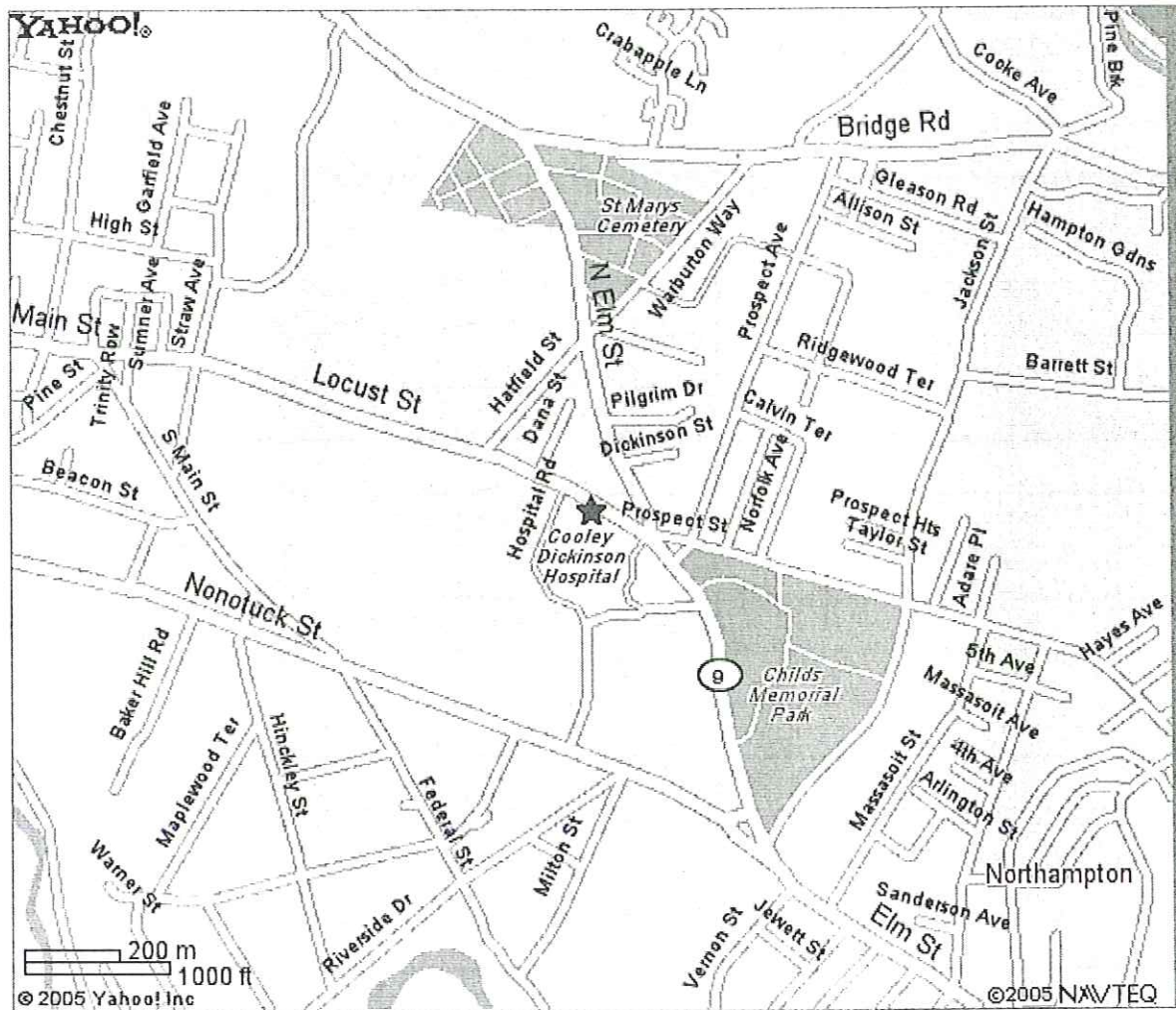
30 Locust Street (Route 9)

Northampton, MA, 01061-5001

Emergency Room-Phone:

1-413-582-2108

Area Map



Directions-

Follow Route 9 from Amherst into North Hampton

Driving Directions

1. Take Route 113 east to Route 3
2. Take Route 3 North (F.E. Everett Turnpike);
3. Take Exit 5E.
4. Go straight through the next two stop signs. At the first set of lights take a right into the St. Joseph Hospital parking lot.

A-0308-7-01
February 28, 2008

Mr. Laurence Hanson
MassDEP Division of Solid Waste
436 Dwight Street
Springfield, MA 01103

Re: Updated Private Well Survey
Feb. 14, 2008 FCSA Extension
Old Amherst Landfill Site
MassDEP SLF# 08-008-001

Dear Mr. Hanson:

On behalf of the Amherst Department of Public Works (DPW), Tighe & Bond is submitting an updated private water well survey for the Old Amherst Landfill site as required by Massachusetts Department of Environmental Protection (MassDEP) correspondence dated October 23, 2007 Interim Comprehensive Site Assessment (CSA) Report Approval and MassDEP correspondence dated February 14, 2008 Final Comprehensive Site Assessment (FCSA) Deadline Extension. In summary, MassDEP has required that the Town update the existing private water well survey for the Old Amherst Landfill for a ½-mile radius from the landfill site including extending survey boundaries to the Fort River west and northwest of the site and to Hop Brook west and southwest of the site. The survey is to be completed by a comparison of Town Water Department records and Assessor records.

Tighe & Bond has completed the survey as required. Attached are tables listing identified private residential drinking water supply wells in the Towns of Amherst, Belchertown and Pelham where parcel boundaries fell within the required private well survey limits. No private residential drinking water supply wells were identified that are downgradient of the Old Amherst Landfill. All identified private wells are upgradient of the Old Amherst Landfill and are not likely to be impacted by the landfill site. A Private Well Survey Map is provided that identifies residential properties with private wells as listed in the attached tables.

Private Well Survey Method

The Town of Amherst provided Tighe & Bond with GIS mapping, Water Department records, Assessor records and the layout of the Towns public water supply system (water lines). Using this data, Tighe & Bond created a half mile survey limit around the property boundaries of the Old Amherst Landfill site and also extended the survey limit Hop Brook south and west of the site and to the Fort River to the west and northwest of the site. Based on the limits of the survey area, the total number of parcels included in the survey was 775 lots. The majority of

the parcels were located in the Town of Amherst with a few lots located in the Towns of Belchertown and Pelham.

Once the parcels were identified in the study area, Tighe & Bond used a process of elimination to reduce the number of parcels in the study area by matching Assessor records and Water Department records to eliminate 545 parcels as each of them had a Water Department account in the Town of Amherst. Of the remaining 230 lots Tighe & Bond was then able to eliminate 207 parcels based on the land use code of each in the Towns GIS database as follows:

- APR TOBACC (2 lots)
- CONDO MDL-05 (88 lots): All are part of Echo Hill Condo Complex, which includes Webster Court, Sutton Court, and Bedford Court
- FIELD CRPS (19 lots)
- MUNICIPAL V (21 lots)
- NONPRWETLD (1 lot)
- PASTURE MDL-00 (2 lots)
- UNDEV LAND (1 lots)
- RES ACLNUV (37 lots): Vacant Land in a Residential Zone or Accessory to Residential Parcel – Developable Land
- RES ACLNUD (30 lots): Vacant Land in a Residential Zone or Accessory to Residential Parcel – Undevelopable Land
- AC LAND IMP (2 lots): Accessory Land with Improvements
- DEVEL LAND (2 lots): Vacant Land – Developable
- PASTURE (3 lots)
- POT DEVEL (1 lot): Vacant Land – Potentially Developable Land

Tighe & Bond subsequently eliminated an additional 8 lots based on their description as Open Space or ROW in the Assessor' database, which then left 15 lots with potential private wells. Also, Tighe & Bond was already aware of 3 lots within the study area that have a confirmed private well, which in turn eliminated those lots leaving 12 lots in Amherst to be field checked.

Parcels located in Belchertown and Pelham were similarly evaluated to determine if developed parcels were served by a private residential water supply well. Because Amherst Town water extends into Belchertown along Route 9 (Federal Street in Belchertown) and along Harkness Road, some of the developed parcels in Belchertown and Pelham are served by the Amherst Town water supply and do not use a private well for domestic supply.

Private Well Survey Results

A total of 24 private water supply wells were identified in the study area; all are located in the upgradient groundwater flow direction from the Old Amherst Landfill. None are likely to be impacted by groundwater quality at the landfill site. The 24 wells consist of 11 private wells in Amherst (10 wells along Harkness Road and one well on Old Belchertown Road), 11 private wells in Pelham along Harkness Road and 2 wells in Belchertown along Route 9 (Federal Street). Private well addresses and parcel identifications are listed on the attached summary table.

If you have any questions or comments on the information provided herein, please do not hesitate to contact me at (413) 572-3260.

Very truly yours,

TIGHE & BOND, INC.



Jeffery J. Thelen, P.G.
Senior Hydrogeologist

J:\A\A0308\Old LF CSA\2008 PW-Survey\0208 CSA Private Well Survey Ltr1.doc

Enclosures

Copy: Mr. Guilford Mooring, P.E., Superintendent, Amherst DPW (w/encl.)

Mr. Robert Pariseau, Director of Water Resources, Amherst DPW (w/encl.)

Map Parcel ID	Address / Location	Owner Name	Parcel Size (Acres)	LandUse
AMHERST				
18D-39	166 HARKNESS RD	SMITH, FREDERICK A & DIANE J	0.88	SINGLE FAM MDL-01
18D-42	196 HARKNESS RD	LAMBERT, MEGAN D & MERGENDAHL, DANA S	1.64	SINGLE FAM MDL-01
18D-41	202 HARKNESS RD	KRIS, JEFFREY D	0.92	SINGLE FAM MDL-01
18D-40	218 HARKNESS RD	WIEMOKLY, GARY E	1.87	SINGLE FAM MDL-01
18D-32	236 HARKNESS RD	CROOKER, BENJAMIN C JR	1.00	SINGLE FAM MDL-01
18D-99	256 HARKNESS RD	PROOTHERS, STEVEN R & LINDA L	0.96	SINGLE FAM MDL-01
18D-100	264 HARKNESS RD	SUNBOW 5 FOUNDATION/PLANETARY	1.54	PRI SCHL R MDL-01
18D-25	284 HARKNESS RD	MAGGS, ANN S	0.92	SINGLE FAM MDL-01
18B-308	318 HARKNESS RD	TOBEY, WILLIAM B	5.41	SINGLE FAM MDL-01
18D-44	300 HARKNESS RD	SKOLFIELD, KAREN D & GOECKEL, DENNIS L	1.70	SINGLE FAM MDL-01
21B-12	126 OLD BELCHERTOWN RD	HOBART, KENNETH E	1.75	SINGLE FAM MDL-01
21A-102	163 WILDFLOWER DR	DORFMAN, KATHERINE A (Geothermal Well)	0.74	SINGLE FAM MDL-01
BELCHERTOWN				
203-8	1310 FEDERAL ST	PELHAM AUTO SERVICE (SEE 203-7 for WELL) BACK in MOTION (CHIROPRACTIC OFFICE) (Note: Parcels 203-6 and 203-7 share a well)		RESIDENCIAL
203-6	1311 FEDERAL ST			COMMERCIAL
203-7	1321 FEDERAL ST			COMMERCIAL
PELHAM				
1-8	100 HARKNESS RD	CRAWFORD CAROLYN M		RESIDENCIAL
1-7	116 HARKNESS RD	SINGER, HOWARD & TERRY		RESIDENCIAL
1-6-1	130 HARKNESS RD	SEYMOUR HARRY & CHARLENA		RESIDENCIAL
1-6-2	132 HARKNESS RD	PRICE ROBERT & PIERRETTE		RESIDENCIAL
1-6-3	134 HARKNESS RD	OSTERWEIL, LEON & CLARKE, LORI A		RESIDENCIAL
1-6-4	136 HARKNESS RD	PALLEY GORDEN B & MIS-PALLEY CYNTHI		RESIDENCIAL
1-6-5	138 HARKNESS RD	ACKER, SARA ELINOFF & PETER P		RESIDENCIAL
1-3.D	140 HARKNESS RD	LUKAS TILMAN & LISA		RESIDENCIAL
1-3-2	144 HARKNESS RD	BURGOFF, JAMES & MATTHEWS, SARAH		RESIDENCIAL
1-2	146 HARKNESS RD	SCHMITTER MONIKA A		RESIDENCIAL
1-3.A	150 HARKNESS RD	SHUMWAY EARLE & JEANNE		RESIDENCIAL

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**
**      HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE      **
**      HELP MODEL VERSION 3.01   (14 OCTOBER 1994)          **
**      DEVELOPED BY ENVIRONMENTAL LABORATORY                **
**      USAE WATERWAYS EXPERIMENT STATION                   **
**      FOR USEPA RISK REDUCTION ENGINEERING LABORATORY      **
**
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PRECIPITATION DATA FILE:  j:\a\0308\help3\precip1.D4
TEMPERATURE DATA FILE:    j:\a\0308\help3\temp1.D7
SOLAR RADIATION DATA FILE: j:\a\0308\help3\solar1.D13
EVAPOTRANSPIRATION DATA:  j:\a\0308\help3\evapo1.D11
SOIL AND DESIGN DATA FILE: j:\a\0308\help3\exist2.D10
OUTPUT DATA FILE:         j:\a\0308\help3\exist2.OUT

```

TIME: 15:53 DATE: 1/19/2009

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TITLE: Old Amherst Landfill - Existing Conditions Soil Cover System

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 5

```

THICKNESS           =      12.00  INCHES
POROSITY             =      0.4570 VOL/VOL
FIELD CAPACITY       =      0.1310 VOL/VOL
WILTING POINT       =      0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT =      0.2468 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.100000005000E-02 CM/SEC
NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.90
      FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

```

LAYER 2

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 10

```

THICKNESS           =      8.00  INCHES
POROSITY             =      0.3980 VOL/VOL
FIELD CAPACITY       =      0.2440 VOL/VOL
WILTING POINT       =      0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT =      0.3980 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.119999997000E-03 CM/SEC

```

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 3

THICKNESS	=	4.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.0830	VOL/VOL
WILTING POINT	=	0.0330	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1321	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.310000009000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 19

THICKNESS	=	420.00	INCHES
POROSITY	=	0.1680	VOL/VOL
FIELD CAPACITY	=	0.0730	VOL/VOL
WILTING POINT	=	0.0190	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0713	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
SOIL DATA BASE USING SOIL TEXTURE # 5 WITH A
GOOD STAND OF GRASS, A SURFACE SLOPE OF 2. %
AND A SLOPE LENGTH OF 500. FEET.

SCS RUNOFF CURVE NUMBER	=	53.30	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	33.640	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	2.962	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.484	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.696	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	36.615	INCHES
TOTAL INITIAL WATER	=	36.615	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
WORCHESTER MASSACHUSETTS

MAXIMUM LEAF AREA INDEX	=	4.00
START OF GROWING SEASON (JULIAN DATE)	=	127
END OF GROWING SEASON (JULIAN DATE)	=	281
AVERAGE ANNUAL WIND SPEED	=	10.30 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	63.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	71.00 %

NOTE: PRECIPITATION DATA FOR WORCESTER
WAS ENTERED FROM THE DEFAULT DATA FILE.

MASSACHUSETTS

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR WORCHESTER MASSACHUSETTS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
23.30	24.80	33.10	45.00	55.70	64.60
69.90	68.00	60.30	50.30	39.50	27.40

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR WORCHESTER MASSACHUSETTS

STATION LATITUDE = 42.21 DEGREES

ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.90	5971334.000	100.00
RUNOFF	7.019	857101.562	14.35
EVAPOTRANSPIRATION	25.539	3118673.250	52.23
PERC./LEAKAGE THROUGH LAYER 2	16.346552	1996129.750	33.43
AVG. HEAD ON TOP OF LAYER 2	0.0165		
PERC./LEAKAGE THROUGH LAYER 4	16.346550	1996129.500	33.43
CHANGE IN WATER STORAGE	-0.005	-569.238	-0.01
SOIL WATER AT START OF YEAR	36.615	4471184.500	
SOIL WATER AT END OF YEAR	36.610	4470615.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.699	0.00

ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	41.77	5100668.500	100.00
RUNOFF	11.355	1386587.000	27.18
EVAPOTRANSPIRATION	21.054	2571006.000	50.41
PERC./LEAKAGE THROUGH LAYER 2	7.743556	945590.375	18.54

AVG. HEAD ON TOP OF LAYER 2	0.0079		
PERC./LEAKAGE THROUGH LAYER 4	12.357518	1509016.120	29.58
CHANGE IN WATER STORAGE	-2.997	-365941.500	-7.17
SOIL WATER AT START OF YEAR	36.610	4470615.500	
SOIL WATER AT END OF YEAR	31.196	3809389.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	2.418	295284.812	5.79
ANNUAL WATER BUDGET BALANCE	0.0000	0.582	0.00

ANNUAL TOTALS FOR YEAR 1979

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	53.69	6556257.500	100.00
RUNOFF	16.706	2039986.250	31.12
EVAPOTRANSPIRATION	24.375	2976469.250	45.40
PERC./LEAKAGE THROUGH LAYER 2	14.258240	1741119.250	26.56
AVG. HEAD ON TOP OF LAYER 2	0.0190		
PERC./LEAKAGE THROUGH LAYER 4	12.333560	1506090.500	22.97
CHANGE IN WATER STORAGE	0.276	33711.922	0.51
SOIL WATER AT START OF YEAR	31.196	3809389.250	
SOIL WATER AT END OF YEAR	33.890	4138386.000	
SNOW WATER AT START OF YEAR	2.418	295284.812	4.50
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.349	0.00

ANNUAL TOTALS FOR YEAR 1980

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	39.25	4792943.000	100.00
RUNOFF	6.731	821953.437	17.15
EVAPOTRANSPIRATION	23.377	2854669.000	59.56

PERC./LEAKAGE THROUGH LAYER 2	9.779118	1194159.370	24.91
AVG. HEAD ON TOP OF LAYER 2	0.0100		
PERC./LEAKAGE THROUGH LAYER 4	9.140528	1116179.120	23.29
CHANGE IN WATER STORAGE	0.001	142.542	0.00
SOIL WATER AT START OF YEAR	33.890	4138386.000	
SOIL WATER AT END OF YEAR	33.891	4138528.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.932	0.00

ANNUAL TOTALS FOR YEAR 1981

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.77	5955460.500	100.00
RUNOFF	7.454	910278.562	15.28
EVAPOTRANSPIRATION	25.980	3172559.500	53.27
PERC./LEAKAGE THROUGH LAYER 2	15.025765	1834844.250	30.81
AVG. HEAD ON TOP OF LAYER 2	0.0134		
PERC./LEAKAGE THROUGH LAYER 4	12.520567	1528926.500	25.67
CHANGE IN WATER STORAGE	2.815	343695.375	5.77
SOIL WATER AT START OF YEAR	33.891	4138528.500	
SOIL WATER AT END OF YEAR	36.705	4482224.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.699	0.00

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1977 THROUGH 1981

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	5.07	3.30	4.06	3.76	3.40	2.67

	4.91	3.61	3.56	5.24	3.41	3.47
STD. DEVIATIONS	5.04	2.94	2.37	0.99	1.00	1.59
	1.90	2.57	2.21	1.10	0.92	2.02

RUNOFF

TOTALS	0.926	2.576	5.262	0.910	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.179
STD. DEVIATIONS	1.357	3.156	3.454	0.827	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.183

EVAPOTRANSPIRATION

TOTALS	0.806	0.855	1.454	2.203	2.985	2.493
	4.108	2.718	2.386	2.024	1.311	0.721
STD. DEVIATIONS	0.156	0.268	0.277	0.319	0.630	1.095
	0.816	0.746	0.658	0.161	0.118	0.124

PERCOLATION/LEAKAGE THROUGH LAYER 2

TOTALS	0.0000	0.0000	0.0044	2.6035	0.9732	0.1375
	0.7969	0.9092	1.0211	2.6873	1.6131	1.8844
STD. DEVIATIONS	0.0000	0.0000	0.0098	0.9240	0.2651	0.1679
	0.7676	1.1116	1.3073	1.2833	0.7787	1.6666

PERCOLATION/LEAKAGE THROUGH LAYER 4

TOTALS	1.4627	0.9258	0.7869	0.6477	0.9436	0.9990
	0.8383	0.8415	0.8031	1.0081	1.3165	1.9666
STD. DEVIATIONS	0.6074	0.3065	0.2150	0.1755	0.3723	0.1955
	0.1425	0.1804	0.3022	0.6114	0.5836	1.0171

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ACROSS LAYER 2

AVERAGES	0.0000	0.0000	0.0000	0.0437	0.0109	0.0016
	0.0078	0.0104	0.0118	0.0318	0.0203	0.0222
STD. DEVIATIONS	0.0000	0.0000	0.0001	0.0367	0.0029	0.0020
	0.0069	0.0128	0.0154	0.0154	0.0097	0.0204

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1977 THROUGH 1981

	INCHES	CU. FEET	PERCENT
PRECIPITATION	46.48 (5.864)	5675332.5	100.00
RUNOFF	9.853 (4.2646)	1203181.37	21.200
EVAPOTRANSPIRATION	24.065 (1.9670)	2938675.25	51.780
PERCOLATION/LEAKAGE THROUGH FROM LAYER 2	12.63065 (3.68132)	1542368.500	27.17671
AVERAGE HEAD ACROSS TOP OF LAYER 2	0.013 (0.005)		
PERCOLATION/LEAKAGE THROUGH FROM LAYER 4	12.53974 (2.55551)	1531268.250	26.98112
CHANGE IN WATER STORAGE	0.018 (2.0601)	2207.82	0.039

PEAK DAILY VALUES FOR YEARS 1977 THROUGH 1981

	(INCHES)	(CU. FT.)
PRECIPITATION	2.71	330926.781
RUNOFF	3.193	389926.5620
PERCOLATION/LEAKAGE THROUGH LAYER 2	2.259400	275902.53100
AVERAGE HEAD ACROSS LAYER 2	2.638	
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.210465	25700.60940
SNOW WATER	11.59	1415773.7500
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4030
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0452

FINAL WATER STORAGE AT END OF YEAR 1981

LAYER	(INCHES)	(VOL/VOL)
1	2.5981	0.2165
2	3.1840	0.3980
3	0.5761	0.1440
4	30.3474	0.0723

SNOW WATER 0.000

TABLE 4. DEFAULT SOIL, WASTE, AND GEOSYNTHETIC CHARACTERISTICS

Classification			Total Porosity	Field Capacity	Wilting Point	Saturated Hydraulic Conductivity
HELP	USDA	USCS	vol/vol	vol/vol	vol/vol	cm/sec
1	CoS	SP	0.417	0.045	0.018	1.0×10^{-2}
2	S	SW	0.437	0.062	0.024	5.8×10^{-3}
3	FS	SW	0.457	0.083	0.033	3.1×10^{-3}
4	LS	SM	0.437	0.105	0.047	1.7×10^{-3}
5	LFS	SM	0.457	0.131	0.058	1.0×10^{-3}
6	SL	SM	0.453	0.190	0.085	7.2×10^{-4}
7	FSL	SM	0.473	0.222	0.104	5.2×10^{-4}
8	L	ML	0.463	0.232	0.116	3.7×10^{-4}
9	SiL	ML	0.501	0.284	0.135	1.9×10^{-4}
10	SCL	SC	0.398	0.244	0.136	1.2×10^{-4}
11	CL	CL	0.464	0.310	0.187	6.4×10^{-5}
12	SiCL	CL	0.471	0.342	0.210	4.2×10^{-5}
13	SC	SC	0.430	0.321	0.221	3.3×10^{-5}
14	SiC	CH	0.479	0.371	0.251	2.5×10^{-5}
15	C	CH	0.475	0.378	0.265	1.7×10^{-5}
16	Barrier Soil		0.427	0.418	0.367	1.0×10^{-7}
17	Bentonite Mat (0.6 cm)		0.750	0.747	0.400	3.0×10^{-9}
18	Municipal Waste (900 lb/yd ³ or 312 kg/m ³)		0.671	0.292	0.077	1.0×10^{-3}
19	Municipal Waste (channeling and dead zones)		0.168	0.073	0.019	1.0×10^{-3}
20	Drainage Net (0.5 cm)		0.850	0.010	0.005	1.0×10^{-1}
21	Gravel		0.397	0.032	0.013	3.0×10^{-1}
22	L*	ML	0.419	0.307	0.180	1.9×10^{-5}
23	SiL*	ML	0.461	0.360	0.203	9.0×10^{-6}
24	SCL*	SC	0.365	0.305	0.202	2.7×10^{-6}
25	CL*	CL	0.437	0.373	0.266	3.6×10^{-6}
26	SiCL*	CL	0.445	0.393	0.277	1.9×10^{-6}
27	SC*	SC	0.400	0.366	0.288	7.8×10^{-7}
28	SiC*	CH	0.452	0.411	0.311	1.2×10^{-6}
29	C*	CH	0.451	0.419	0.332	6.8×10^{-7}
30	Coal-Burning Electric Plant Fly Ash*		0.541	0.187	0.047	5.0×10^{-5}
31	Coal-Burning Electric Plant Bottom Ash*		0.578	0.076	0.025	4.1×10^{-3}
32	Municipal Incinerator Fly Ash*		0.450	0.116	0.049	1.0×10^{-2}
33	Fine Copper Slag*		0.375	0.055	0.020	4.1×10^{-2}
34	Drainage Net (0.6 cm)		0.850	0.010	0.005	3.3×10^{-1}

* Moderately Compacted

(Continued)

TABLE 2.2

Landfill Cap Barrier Layer - Hydraulic Conductivity Estimates
Old Amherst Landfill CSA Study

Tighe & Bond, Inc.

Soil Sample	Barrier Layer Depth (inches bg)	Soil Description (Geotechnical laboratory)	ASTM Method D1557		ASTM Method D5084 Hydraulic Conductivity (cm/sec)
			Maximum Dry Density (lbs./ft ³)	Optimum Content (% H ₂ O)	
Test Hole #25	12-19	Brown Silty Sand	120.0	13.0%	1.4E-04
Test Hole #102	12-18	Yellowish Brown Silty Sand	xxx	xxx	2.7E-06
Test Hole #121	9-18	Yellowish Brown Silty Sand	xxx	xxx	8.5E-05
Test Hole #136	8-15	Yellowish Brown Silty Sand	xxx	xxx	8.4E-05
Test Hole #149	9-15	Yellowish Brown Silty Sand	xxx	xxx	2.7E-04
Test Hole #163	10-15	Yellowish Brown Silty Sand	xxx	xxx	3.4E-04
Average Estimated Hydraulic Conductivity of the Cap Barrier Layer =					1.5E-04
Median Estimated Hydraulic Conductivity of the Cap Barrier Layer =					1.1E-04

Samples Collected Nov. 17, 2005. Barrier layer sample recovery may have been compromised by heavy rains causing puddling in test holes.

TABLE 2.1 - Landfill Test Hole Data
Old Amherst Landfill
Belchertown Road (Route 9), Amherst, MA
Data collected September 20, 21 and 27, 2005

Station ID	Depth (inches)	Soil Description	% LEL	%O2	H2S (ppm)	PID - VOCs (ppm)
1	Ground Cover	6 - 8" Grass and weeds				
	0-3"	Dark brown very fine sand, trace silt, trace small gravel				
	3-6"	Dark brown very fine sand, trace silt				
	6-12"	Dark brown very fine sand, trace silt				
	12-15"	Light brown/yellow very fine sand, trace silt	0	22.5	0	0.2
	15-24"	Grey silt and clay (dry)				
6	Ground Cover	8-10" Grass and weeds				
	0-4"	Dark brown very fine sand, trace silt, trace small gravel				
	4-11"	Dark brown very fine sand, trace silt				
	11-13"	Light brown very fine sand, trace silt	0	22.6	0	0
	13-24"	Grey clay and silt (moist)				
9	Ground Cover	6-8" Grass and weeds				
	0-8"	Dark brown very fine sand, trace silt				
	8-13"	Light brown/yellow very fine sand, trace silt	0	22.6	0	0
	13-23"	Grey silt and clay (dry)				
	23-25"	Light brown very fine sand, trace silt				
14	Ground Cover	8-10" Grass and weeds				
	0-5"	Dark brown very fine sand, trace silt				
	5-12"	Light brown very fine sand, trace silt				
	12-24"	Light grey silt and clay (dry)	0	21.8	0	0.4
	24-25"	Dark grey very fine sand and trace silt				
19	Ground Cover	8-10" Grass and weeds				
	0-6"	Dark brown very fine sand, trace silt				
	6-13"	Light brown very fine sand, trace silt	0	22.6	0	0
	13-21"	Grey clayey silt (dry)				
	21-36"	Light brown very fine sand, trace silt				
25	Ground Cover	6-8" Grass and weeds				
	0-6"	Dark brown very fine sand, trace silt				
	6-12"	Light brown very fine sand, trace silt	0	22.7	0	0.3
	12-19"	Grey clayey silt (dry)				
	21-36"	Light brown very fine sand, trace silt				
30	Ground Cover	6-8" Grass and weeds				
	0-6"	Dark brown very fine sand, trace silt				
	6-12"	Light brown very fine sand, trace silt	0	22.6	0	0.5
	12-17"	Grey silt and clay (dry)				
	17-25"	Light brown fine sand, trace silt				
33	Ground Cover	8-18" Grass and weeds				
	0-10"	Dark brown very fine sand, trace silt, trace small gravel				
	10-15"	Light brown very fine sand, trace silt	0	22.7	0	0
	15-24"	Grey clay and silt (moist)				
38	Ground Cover	6-8" Grass and weeds				
	0-6"	Dark brown very fine sand, trace silt				
	6-12"	Light brown very fine sand, trace silt	0	22.8	0	0
	12-24"	Grey silt and clay (dry)				
	24-28"	Light brown fine to medium sand, trace silt, trace small gravel				
42	Ground Cover	6-8" Grass and weeds				
	0-6"	Brown very fine sand, trace silt				
	6-12"	Light brown/orange very fine sand, trace silt	0	22.8	0	0
	12-24"	Clayey silt, some very fine sand				
	24-28"	Brown very fine sand, trace silt				

TABLE 2.1 - Landfill Test Hole Data
Old Amherst Landfill
Belchertown Road (Route 9), Amherst, MA
Data collected September 20, 21 and 27, 2005

47	Ground Cover	6-12" Grass and weeds				
	0-6"	Dark brown very fine sand, trace silt				
	6-12"	Light brown very fine sand, trace silt	0	22.6	0	0
	12-21"	Grey silt and clay (dry)				
	21-24"	Light brown very fine sand, trace silt				
52	Ground Cover	6-8" Grass and weeds				
	0-6"	Brown very fine sand, trace silt				
	6-12"	Light brown very fine sand, trace silt	0	22.9	0	0
	12-17"	Light brown fine sand, some clayey silt (dry)				
	17-24"	Light brown very fine sand, trace silt				
57	Ground Cover	6-10" Grass and weeds				
	0-6"	Brown very fine sand, trace silt				
	6-12"	Light brown very fine sand, trace silt	0	22.9	0	0
	12-19"	Grey silt and clay, trace fine sand (dry)				
	19-24"	Light brown fine sand, trace silt				
62	Ground Cover	6-8" Grass and weeds				
	0-8"	Light brown very fine sand, trace silt	0	22.6	0	0
	8-15"	Grey clayey silt (dry)				
	15-19"	Light brown very fine sand, trace silt				
68	Ground Cover	6-8" Grass and weeds				
	0-6"	Brown very fine sand, trace silt				
	6-12"	Light brown/orange very fine sand, trace silt	0	22.8	0	0
	12-20"	Silt and clay, trace fine sand (dry)				
	2-26"	Light brown fine sand, trace silt				
73	Ground Cover	6-8" Grass and weeds				
	0-6"	Brown very fine sand, trace silt				
	6-15"	Light brown very fine sand, trace silt	0	22.7	0	0
	15-27"	Grey clay and silt (moist)				
	27-32"	Light brown fine sand				
78	Ground Cover	6-8" Grass and weeds				
	0-6"	Brown very fine sand, trace silt				
	6-12"	Light brown very fine sand, trace silt	0	22.8	0	0
	12-17"	Fine sand, some clayey silt (dry)				
80	Ground Cover	6-8" Grass and weeds				
	0-8"	Brown very fine sand, trace silt				
	8-14"	Light brown very fine sand, trace silt	0	22.9	0	0
	14-22"	Light brown sand, some clayey silt				
	22-28"	Light brown/yellow very fine sand, trace silt				
85	Ground Cover	8-10" Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-11"	Light brown very fine sand, trace silt	0	22.6	0	0
	11-18"	Grey silt and clay (dry)				
	18-26"	Light brown very fine to medium sand, trace silt				
90	Ground Cover	8-12" Grass and weeds				
	0-4"	Dark brown very fine sand, trace silt				
	4-7"	Light brown very fine sand, trace silt	0	22.8	0	0
	7-12"	Light brown fine sand, some clayey silt (dry)				
	12-24"	Light brown fine sand, trace silt				
97	Ground Cover	8-10" Grass and weeds				
	0-8"	Brown very fine sand, trace silt				
	8-15"	Light brown very fine sand, trace silt	0	22.7	0	0
	15-19"	Grey clay and silt (moist)				
	19-26"	Grey fine to medium sand, trace silt				

TABLE 2.1 - Landfill Test Hole Data
 Old Amherst Landfill
 Belchertown Road (Route 9), Amherst, MA
 Data collected September 20, 21 and 27, 2005

102	Ground Cover	6-8" Grass and weeds				
	0-6"	Dark brown very fine sand, trace silt				
	6-12"	Light brown very fine sand, trace silt	0	22.9	0	0
	12-18"	Clayey silt, trace fine sand				
	18-24"	Light brown fine sand, trace small gravel				
109	Ground Cover	6-10" Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-12"	Light brown very fine sand, trace silt	0	22.6	0	0
	12-18"	Light brown very fine sand, some clayey silt (dry)				
	18-30"	Brown fine to medium sand, trace small gravel, trace glass				
114	Ground Cover	6-8" Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-9"	Light brown very fine sand, trace silt	0	22.7	0	0
	9-15"	Light brown very fine sand, and clayey silt				
	15-24"	Brown fine sand, trace silt, trace brick and glass				
116	Ground Cover	6-8" Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-12"	Grey fine sand trace silt, trace clay	0	22.6	0	0
	12-18"	Brown fine sand, trace silt, trace small gravel				
	18-24"	Light brown fine sand, trace small gravel				
121	Ground Cover	6-8" Grass and weeds				
	0-5"	Brown very fine sand, trace silt				
	5-9"	Light brown very fine sand, trace silt	0	22.7	0	0
	9-18"	Light brown very fine sand and clayey silt (dry)				
	18-24"	Brown fine sand, trace silt, trace glass				
128	Ground Cover	6-8" Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-9"	Light brown very fine sand, trace silt	0	22.7	0	0
	9-15"	Grey clayey silt (dry)				
	15-24"	Brown fine sand, trace silt				
136	Ground Cover	4-6" Grass and weeds				
	0-5"	Brown very fine sand, trace silt				
	5-8"	Light brown very fine sand, trace silt	0	22.8	0	0
	8-15"	Light brown very fine sand and clayey silt (dry)				
	15-24"	Brown very fine sand, trace silt				
141	Ground Cover	6-8" Grass and weeds				
	0-5"	Brown very fine sand, trace silt				
	5-9"	Light brown very fine sand, trace silt	0	22.7	0	0
	9-15"	Light brown very fine sand and clayey silt (dry)				
	15-24"	Light brown fine sand, trace silt				
144	Ground Cover	4" Grass				
	0-8"	Brown very fine sand, trace silt	0	22.8	0	0
	8-12"	Light brown/yellow fine sand, trace silt (dry)				
	12-24"	Light brown fine to medium sand, trace silt, trace small gravel				
149	Ground Cover	4-8 " Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-9"	Light brown very fine sand, trace silt				
	9-15"	Light brown very fine sand and clayey silt (dry)				
	15-24"	Brown fine sand, trace silt				

TABLE 2.1 - Landfill Test Hole Data
 Old Amherst Landfill
 Belchertown Road (Route 9), Amherst, MA
 Data collected September 20, 21 and 27, 2005

156	Ground Cover	6-8" Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-9"	Light brown very fine sand, trace silt	0	22.6	0	0
	9-15"	Grey light brown clayey silt (dry)				
	15-20"	Brown fine to medium sand, trace silt				
	20-24"	Brown fine to medium sand, trace silt, trace wood debris				
163	Ground Cover	6-8" Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-10"	Light brown very fine sand, trace silt	0	22.6	0	0
	10-15"	Grey/ light brown very fine sand and clayey silt (dry)				
	15-24"	Light brown fine sand, trace silt				
168	Ground Cover	8-10" Grass and weeds				
	0-26"	Brown very fine sand, trace silt, some small gravel	0	22.9	0	0
169	Ground Cover	8-10" Grass and weeds				
	0-5"	Brown very fine sand, trace silt				
	5-11"	Light brown very fine sand, trace silt	0	22.6	0	0
	11-16"	Grey fine sand, some clayey silt (dry)				
	16-26"	Brown fine sand, trace clay, trace tar, trace glass				
174	Ground Cover	4-6" Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-9"	Light brown very fine sand, trace silt	0	22.7	0	0
	9-16"	Light brown very fine sand and clayey silt (dry)				
	16-24"	Light brown fine to coarse sand, trace silt				
	24-28"	Land fill debris				
179	Ground Cover	6-8" Grass and weeds				
	0-4"	Brown very fine sand, trace silt				
	4-8"	Light brown very fine sand, trace silt, trace small gravel	0	22.6	0	0
	8-13"	Light brown very fine sand, trace silt				
	13-18"	Brown fine sand, trace silt				
	18-24"	Light brown fine to coarse sand, trace silt				
184	Ground Cover	4-8" Grass and weeds				
	0-30"	glass fragments and evidence of urban fill	0	22.9	0	0
189	Ground Cover	4-8" Grass and weeds				
	0-36"	Light brown very fine sand, trace silt	0	22.9	0	0
193	Ground Cover	Sparse moss, clumps of 2-3" grass				
	0-30"	Light brown very fine sand, trace silt	0	22.9	0	0
197	Ground Cover	Sparse moss, and grass				
	1-42"	Light brown very fine sand, trace silt	0	22.9	0	0
205	Ground Cover	Sparse dried moss				
	0-1"	Brown very fine sand, trace silt				
	1-30"	Light brown very fine sand and clayey silt (dry)	0	22.9	0	0
207	Ground Cover	Thick moss and pine saplings				
	1-30"	Light brown very fine sand, trace silt	0	22.8	0	0

Notes:

- 1) % LEL, % O₂, H₂S (ppm) and PID - VOC (ppm) data collected within the test hole above the landfill cap layer.
 2) Bold descriptions indicate landfill cap barrier layer characterization.

Drilling contractors

Belchertown, MA 01007

Fax (413) 323-0200

Drill/Crew: J.M.

Field Obs. Only	Sump ____ FT. ____ Dia. ____	Filter Sand <u>300#</u>	Concrete <u>6 bgs</u>
<u>Portions Used</u> Trace: 0-10% Little: 10-20% Some: 20-35% And: 35050%	Screen <u>10</u> Ft. <u>010</u> Slot <u>2'</u> Dia. Riser <u>11'</u> Ft. <u>2"</u> Dia. Endcaps <u>1</u> Expansion Plug <u>1</u>	Bentonite <u>50#</u> Bentonite ____ Portland ____	Flush ____ Stand Up <u>4"x5'</u> Misc. ____

Martin

Geo-Environmental, LLC

Drilling contractors

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
Fax (413) 323-0200

Well #: 2-08 Start: 6/16/2008 Finish: 6/16/2008
Sheet: 1 of 2
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: J.M.

Auger Size 4.25"ID		Casing Size		Sampling 5'		Core Barrel		Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks	
		0-6	6-12	12-18	18-24				
S-1	0-2'	3	5	8	15	12"		0-5" Topsoil. 5-12" Brown fine SAND, little silt, coarse sand, trace gravel. MOIST	
S-2	5-7'	50 0"				0"		No Recovery, spoon DRY	
S-3	10-12'	11	24	31	23	10"		Gray/tan fine SAND and GRAVEL, little coarse sand. DRY	
S-4	15-17'	5	5	8	9	6"		Gray medium SAND, little gravel. DRY	
S-5	20-22'	3	4	6	7	12"		Gray/brown fine-medium SAND, trace gravel. DRY	
S-6	25-27'	2	6	11	10	15"		Gray/brown fine SAND. MOIST	
S-7	30-32'	9	11	12	12	14"		Gray/brown fine-coarse SAND, little gravel. DRY	
S-8	35-37'	3	12	13	13	14"		Gray/brown fine-coarse SAND, little gravel. DRY	
S-9	40-42'	9	18	15	18	12"		Gray/brown fine-medium SAND, little coarse sand, gravel. DRY	
S-10	45-47'	6	8	13	12	18"		Gray/brown fine-medium SAND, little gravel. DRY	
S-11	50-52'	6	9	12	16	19"		Gray fine SAND, trace medium sand. MOIST	
S-12	55-57'	14	27	18	45	0"		No Recovery, spoon DRY	
Field Obs. Only		Sump _____ FT. _____ Dia. _____				Filter Sand		Concrete	
Portions Used		Screen _____ Ft. _____ Slot _____ Dia.				Bentonite		Flush _____	
Trace: 0-10%		Riser _____ Ft. _____ Dia.				Bentonite _____		Stand Up _____	
Little: 10-20%		Endcaps _____ Expansion Plug				Portland _____		Misc. _____	
Some: 20-35%									
And: 35050%									

Geo-Environmental, LLC
Drilling contractors

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
Fax (413) 323-0200

Well #: 2-08 Start: 6/16/2008 Finish: 6/16/2008

Sheet: 2 of 2

Client: Tighe & Bond Inspector: J.M.P.

Project: Old Amherst Landfill #: A-0308-7-02

Location: Amherst, MA

Well Locus: _____

Drill/Crew: J.M.[illegible]

Martin

Geo-Environmental, LLC

Drilling contractors

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
Fax (413) 323-0200

Well #: 3-08 Start: 6/17/2008 Finish: 6/17/2008

Sheet: 1 of 2

Client: Tighe & Bond Inspector: J.M.P.

Project: Old Amherst landfill #: A-0308-7-02

Location: Amherst, MA

Well Locus: _____

Drill/Crew: J.M.

Auger Size 4.25"ID		Casing Size		Sampling 5'		Core Barrel		Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks	
		0-6	6-12	12-18	18-24				
S-1	0-2'	2	7	12	12	20"		0-7" Topsoil, 7-20" Brown fine SAND, little medium sand, gravel, trace silt. DRY	
S-2	5-7'	7	10	8	9	22"		Brown/gray medium SAND, little coarse sand, gravel. DRY	
S-3	10-12'	2	4	5	6	18"		Brown fine-medium SAND, little gravel. MOIST	
S-4	15-17'	5	4	7	5	24"		Gray/brown fine SAND, trace gravel. MOIST	
S-5	20-22'	3	4	5	5	18"		Gray/brown fine SAND, trace silt. DRY	
S-6	25-27'	4	5	6	8	22"		Brown fine SAND, little medium sand, trace gravel. DRY	
S-7	30-32'	7	13	20	23	14"		Gray fine SAND and GRAVEL, little coarse sand. DRY	
S-8	35-37'	5	7	9	9	20"		Brown/gray fine-medium SAND, little coarse sand, gravel. MOIST	
S-9	40-42'	3	8	7	8	17"		Gray/brown fine-medium SAND, trace coarse sand, trace gravel. DRY	
S-10	45-47'	6	10	12	11	16"		Gray/brown fine SAND, some coarse sand, trace gravel. DRY	
S-11	50-52'	4	10	12	18	21"		Brown fine-medium SAND, trace coarse sand, gravel. DRY	
S-12	55-57'	6	7	10	15	17"		Brown fine SAND, little silt, trace coarse sand. DRY	
Field Obs. Only		Sump _____ FT. _____ Dia. _____				Filter Sand		Concrete	
Portions Used		Screen _____ Ft. _ Slot _ Dia.				Bentonite		Flush _____	
Trace: 0-10%		Riser _ Ft. _ Dia.				Bentonite _____		Stand Up _	
Little: 10-20%		Endcaps _ Expansion Plug				Portland _____		Misc. _____	
Some: 20-35%									
And: 35050%									

Martin

Tel: (413) 323-8700
Fax (413) 323-0200

Drill/Crew: J.M.

Concrete 6 bgs
Flush _____
Stand Up 4"x5'
Misc. _____

Martin

Geo-Environmental, LLC

Drilling contractors

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
Fax (413) 323-0200

Well #: 4-08 Start: 6/18/2008 Finish: 6/20/2008

Sheet: 1 of 3

Client: Tighe & Bond Inspector: J.M.P.

Project: Old Amherst Landfill #: A-0308-7-02

Location: Amherst, MA

Well Locus: _____

Drill/Crew: J.M.

Auger Size 4.25"ID		Casing Size HW (4")		Sampling 5'		Core Barrel NQ-2		Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks	
		0-6	6-12	12-18	18-24				
S-1	0-2'	2	1	2	4	12"		Brown fine SAND, little coarse sand, trace gravel. DRY	
S-2	5-7'	10	15	6	18	4"		Brown fine SAND, little coarse sand, trace gravel. DRY	
S-3	10-12'	8	8	10	13	12"		Brown/gray fine-medium SAND, some coarse sand, little gravel, trace silt. WET	
S-4	15-17'	1	1	1	1	6"		Brown fine-medium SAND, little coarse sand, silt. WET	
S-5	18-20'	6	6	6	7	11"		Brown fine SAND, little sil;t. WET	
S-6	23-25'	4	5	7	8	12"		Brown fine SAND, trace gravel, silt. WET	
S-7	28-30'	5	5	8	8	10"		Brown fine SAND, little gravel, trace silt. WET	
S-8	33-35'	1	2	4	4	14"		Brown fine-medium SAND. WET	
S-9	38-40'	4	5	13	24	24"		Brown medium SAND, little coarse sand, trace silt. WET	
S-10	43-45'	2	2	4	8	20"		Brown fine SAND and SILT, trace clay. WET	
S-11	48-50'	4	5	9	13	24"		Brown coarse SAND, some medium sand, trace gravel. WET	
S-12	53-55'	100	5"			3"		Red/brown weathered, pulverized micaceous arkosic sandstone.	
Field Obs. Only		Sump _____ FT. _____ Dia. _____				Filter Sand		Concrete	
Portions Used		Screen _ Ft. _ Slot _ Dia.				Bentonite		Flush	
Trace: 0-10%		Riser _ Ft. _ Dia.				Bentonite		Stand Up	
Little: 10-20%		Endcaps _ Expansion Plug				Portland		Misc. _____	
Some: 20-35%									
And: 35050%									

Martin

Geo-Environmental, LLC

Drilling contractors

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
Fax (413) 323-0200

Well #: 4-08 Start: 6/18/2008 Finish: 6/20/2008

Sheet: 2 of 3

Client: Tighe & Bond Inspector: J.M.P.

Project: Old Amherst Landfill #: A-0308-7-02

Location: Amherst, MA

Well Locus: _____

Drill/Crew: J.M.

Auger Size 4.25"ID		Casing Size HW (4")		Sampling 5'		Core Barrel NQ-2		Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks	
		0-6	6-12	12-18	18-24				
S-13	58- 60'	100 1.5"				2"		Red/brown weathered, pulverized, micaceous ARKOSIC SANDSTONE bedrock. WET	
S-14	63- 65'	100 1"				1"		Red/brown weathered, micaceous ARKOSIC SANDSTONE bedrock. WET	
S-15	68- 70'	100 1.5"				0"		No Recovery, spoon WET	
S-16-	73- 75'	100 1"				1"		Red/brown weathered micaceous ARKOSIK SANDSTONE bedrock. WET	
S-17	73- 75'	100 2"				1.5"		(3" spoon for resample) red/brown weathered ARKOSIC SANDSTONE Bedrock. WET	
								Roller Bit to 78'	
C-1	78- 83'				min/ft 3 3 4 3 3	45"		Red Arkosic Sandstone	
C-2	83- 88'				3 3 4 4	56"		Red Arkosic Sandstone	
C-3	88- 93'				3 4 3 4 4	51"		Red Arkosic Sandstone	
								EOB 93' WATER @ 12'	
Field Obs. Only		Sump _____ FT. _____ Dia. _____				Filter Sand		Concrete	
Portions Used		Screen _ Ft. _ Slot _ Dia.				Bentonite		Flush	
Trace: 0-10%		Riser _ Ft. _ Dia.				Bentonite		Stand Up	
Little: 10-20%		Endcaps _ Expansion Plug				Portland		Misc. _____	
Some: 20-35%									
And: 35050%									

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Well #: 4-08 Start: 6/18/2008 Finish: 6/20/2008
Sheet: 3 of 3
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: J.M.

[illegible]

~~Sheet 1 of 1~~

Well Number: 4-08

Coring Date: 6-19-08

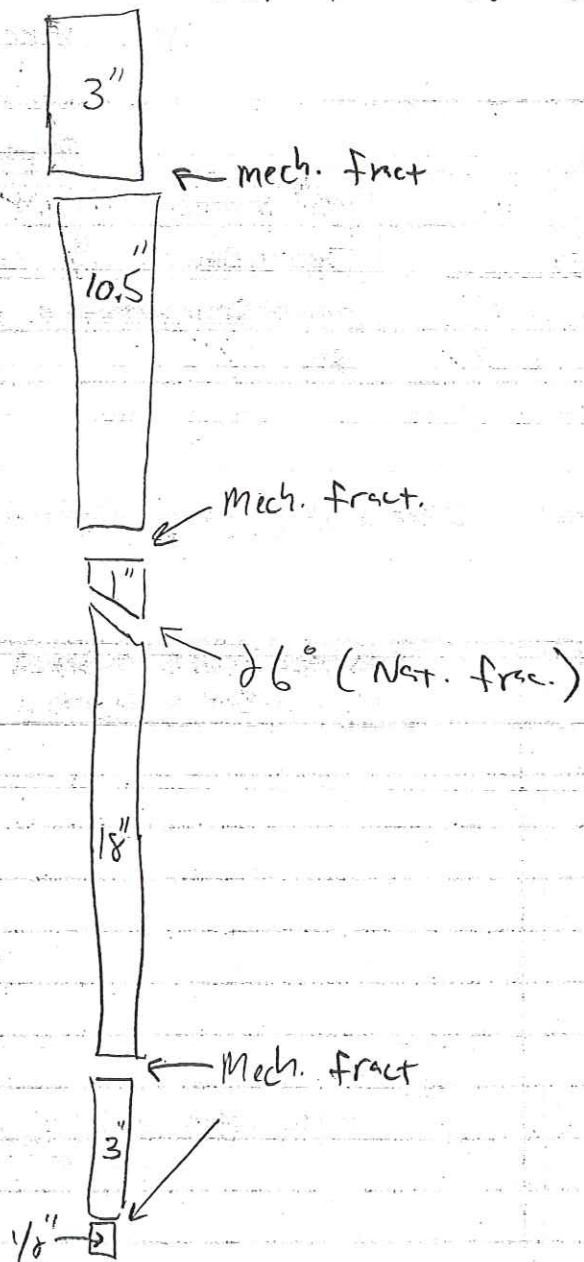
No. of Core Segments: 6

RQD: 75 %

Used MQ2 core barrel: ID = 1.99" OD = 2.97" (Per Mike Martin)

1/20/2009

Core #1 78'-83'



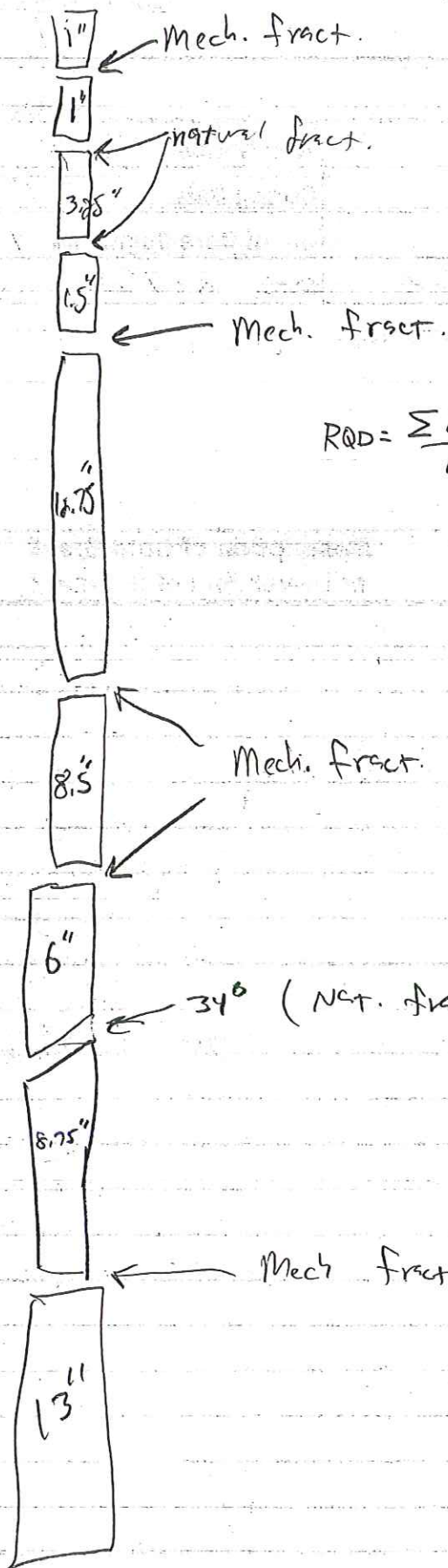
$$RQD = \frac{\sum L (< 4")}{R-C} \times 100 = \frac{36.7}{60 - 12} \times 100 = 75\%$$

Sheet 1 of 1

General Description of Cored Material: R/B. Arkasic Sandstone

Ø core left in borehole after coring - Taped to 88' 3"

Core #2 83'-88'



$$RQD = \frac{\sum L (< 4")}{R-C} \times 100 = \frac{52.5}{60-0} \times 100 = 87.5\%$$

~~Sheet 1 of 1~~

General Description of Cored Material: R / Br. Arkosic Sandstone

1/20/2009

Core #3 88' - 93'

16.75"

Mech. fract.

12"

$$RAD = \frac{\sum L (< 4")}{R+C} \times 100 = \frac{50.75"}{60" - 5"} \times 100 = 91.36 \%$$

3"

Mech. fract.

9"

10"

20° (Net. frac.)

TYPE OR PRINT ONLY

Well Completion Report

WELL LOCATION		GPS (Required) North <u>42° 21' 21" W</u> West <u>72° 49' 10" E</u>	
Address at Well Location: <u>OLD DELLCHERTOWN RD</u>		Property Owner/Client: <u>AMHURST LAND FILL</u>	
Subdivision Name: _____		Mailing Address: _____	
City/Town: <u>AMHURST</u>		City/Town: <u>AMHURST MA</u>	
Assessors Map _____ Assessors Lot #: _____		NOTE: Assessors Map and Lot # mandatory if no street address available	
Board of Health permit obtained: Yes <input type="checkbox"/> Not Required <input checked="" type="checkbox"/>		Permit Number _____ Date Issued _____	

2. WORK PERFORMED		3. WELL TYPE		4. DRILLING METHOD		6. CASING																										
<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">N</div> <div style="border: 1px solid black; padding: 2px;">W</div> </div>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">M</div> <div style="border: 1px solid black; padding: 2px;">O</div> <div style="border: 1px solid black; padding: 2px;">N</div> <div style="border: 1px solid black; padding: 2px;">T</div> </div>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">A</div> <div style="border: 1px solid black; padding: 2px;">R</div> </div>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">A</div> <div style="border: 1px solid black; padding: 2px;">H</div> </div>		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>From (ft)</th> <th>To (ft)</th> <th>Type</th> <th>Thickness</th> <th>Diameter</th> </tr> <tr> <td>0</td> <td>158</td> <td>574</td> <td>177</td> <td>6.14</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>					From (ft)	To (ft)	Type	Thickness	Diameter	0	158	574	177	6.14										
From (ft)	To (ft)	Type	Thickness	Diameter																												
0	158	574	177	6.14																												

5. WELL LOG		OVERBURDEN		Water Bearing Zone	Loss or Addition of Fluid	Drop in Drill Stem	Extra Fast or Slow Drill Rate
		LITHOLOGY					
From (ft)	To (ft)	Code	Color	Comment			
0	20	SG	YB		Y/N	Y/N	F/S
20	40	SG	YB		Y/N	Y/N	F/S
40	60	SG	YB		Y/N	Y/N	F/S
60	80	SG	YB		Y/N	Y/N	F/S
80	100	SG	YB		Y/N	Y/N	F/S
100	120	SH	YB		Y/N	Y/N	F/S
120	135	SH	YB		Y/N	Y/N	F/S

7. SCREEN		From (ft)	To (ft)	Type	Slot Size	Diameter

8. ANNULAR SEAL/FILTER PACK/ABANDONMENT MTL.			
From (ft)	To (ft)	Material Description	Purpose

WELL LOG		BEDROCK		Water Bearing Zone	Drop in Drill Stem	Extra Large Chips	Extra Fast or Slow Drill Rate	Visible Rust Staining	Loss or Addition of Fluid	# of Fractures per foot
		LITHOLOGY								
From (ft)	To (ft)	Code	Comment							
135	210	SH	NO WATER	Y/N	Y/N	F/S	Y/N	Y/N	Y/N	Y/N
				Y/N	Y/N	F/S	Y/N	Y/N	Y/N	Y/N
				Y/N	Y/N	F/S	Y/N	Y/N	Y/N	Y/N
				Y/N	Y/N	F/S	Y/N	Y/N	Y/N	Y/N
				Y/N	Y/N	F/S	Y/N	Y/N	Y/N	Y/N
				Y/N	Y/N	F/S	Y/N	Y/N	Y/N	Y/N
				Y/N	Y/N	F/S	Y/N	Y/N	Y/N	Y/N
				Y/N	Y/N	F/S	Y/N	Y/N	Y/N	Y/N
				Y/N	Y/N	F/S	Y/N	Y/N	Y/N	Y/N

10. WELL TEST DATA (ALL SECTIONS MANDATORY FOR PRODUCTION WELLS)							11. STATIC WATER LEVEL (ALL WELLS)	
Date	Method	Yield (GPM)	Time Pumped (hrs & min)	Pumping Level (Ft. BGS)	Time to Recover (hrs & min)	Recovery (Ft. BGS)	Date Measured	Depth Below Ground Surface (ft)
7/9/08	AB	0	1 HR	210 ft	NO REC.	0	7908	210 ft

12. PERMANENT PUMP (IF AVAILABLE)				13. ADDITIONAL WELL INFORMATION			
Pump Description <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Horsepower _____ Pump Intake Depth _____ (ft) Nominal Pump Capacity _____ (gpm)				Developed Y/N Fracture Enhancement Y/N Disinfected Y/N Surface Seal Type <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Total Well Depth <u>210 ft</u> Depth to Bedrock <u>135 ft</u>			

14. COMMENTS	
<u>MONITORING WELL ONLY</u>	

15. WELL DRILLER'S STATEMENT	
This well was drilled, altered, and/or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge.	
Driller: <u>James Bringham</u>	Supervising Driller Signature: <u>Mike Sullivan</u>
Firm: <u>Mike Sullivan Inc.</u>	Date Complete: <u>7/9/08</u>
Registration #: <u>11731</u>	Rig Permit #: <u>0451</u>

NOTE: Well Completion Reports must be filed by the registered well driller within 30 days of well completion.

BOARD OF HEALTH COPY

Martin Geo-Environmental, LLC

293 North Liberty St
P.O. Box 646
Belchertown, MA 01007

Invoice

Date	Invoice #
7/29/2008	1246

Bill To
Tighe & Bond 53 Southampton Rd Westfield, MA 01085 Jeff Thelen

P.O. No.	Terms	Project
task# 03-015-158	NET 30 DAYS	Amherst, MA

Quantity	Description	Rate	Amount
210	Drill Rig / Crew, Air Rotary/Mud Drilling, 210' TD	15.00	3,150.00
158	Steel Casing, 6" 158'	15.00	2,370.00
1	Mob/Demob	500.00	500.00
1	Drive Shoe Seal 6"	50.00	50.00
5	Bentonite GEL Drilling Mud	15.00	75.00
1	Well Cap 6"	65.00	65.00
Work Dates: 7/9-10/08 Old Amherst Landfill, Amherst, MA			
5% Discount if paid in full within 15 days		Total	\$6,210.00

Martin

Geo-Environmental, LLC

Drilling contractors

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
Fax (413) 323-0200

Well #: 6-08 Start: 8/11/2008 Finish: 8/12/2008
Sheet: 1 of 2
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

Auger Size 4.25"ID		Casing Size HW		Sampling 5'		Core Barrel		Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks	
		0-6	6-12	12-18	18-24				
S-1	0-2'	8	11	10	9	3"		Topsoil, Rock in spoon tip. DRY	
S-2	5-7'	11	14	19	18	15"		Brown fine SAND, trace medium sand, silt DRY	
S-3	10-12'	5	7	12	12	23"		Gray CLAYEY SILT. MOIST	
S-4	15-17'	2	3	5	5	24"		Gray CLAY, trace silt. WET	
S-5	20-22'	3	4	5	5	24"		Gray SILTY CLAY. WET	
								Pulled HSA, Installed HW Casing	
S-6	25-27'	3	3	3	5	24"		Gray SILTY CLAY. WET	
S-7	30-32'	4	5	5	7	19"		Gray CLAY and SILT, trace very fine sand. WET	
S-8	35-37'	4	4	5	5	24"		0-12" Gray CLAY and SILT, trace very fine sand. 12-24" Brown SILT, some very fine sand, trace clay. WET	
S-9	40-42'	8	16	10	25	24"		Brown very fine-fine SAND, little silt. WET	
Field Obs. Only		Sump _____ FT. _____ Dia. _____				Filter Sand		Concrete	
Portions Used		Screen _____ Ft. _ Slot _ Dia.				Bentonite		Flush _____	
Trace: 0-10%		Riser _ Ft. _ Dia.				Bentonite _____		Stand Up _	
Little: 10-20%		Endcaps _ Expansion Plug				Portland _____		Misc. _____	
Some: 20-35%									
And: 35-50%									

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Well #: 6-08 Start: 8/11/2008 Finish: 8/12/2008
Sheet: 2 of 2
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst landfill #: A=0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

[illegible]

Martin

Tel: (413) 323-8700
Fax (413) 323-0200

Sheet: 1 of 1

Project: Old Amherst Landfill #: A-0308-7-02

Location: Amherst, MA

Well Locus: _____

Drill/Crew: M.M.

[illegible]

Well #: 8-08 Start: 8/12/2008 Finish: 8/12/2008
Sheet: 1 of 1
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

[illegible]

Martin

Geo-Environmental, LLC

Drilling contractors

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
Fax (413) 323-0200

Well #: 9-08 Start: 8/12/2008 Finish: 8/18/2008
Sheet: 1 of 4
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

Auger Size 4.25"ID		Casing Size HW		Sampling 5'		Core Barrel	Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks
		0-6	6-12	12-18	18-24			
S-1	0-2'	2	2	2	3	7"		Brown fine-medium SAND, little coarse sand. MOIST
S-2	5-7'	2	8	16	17	16"		Brown fine-very fine SAND, little medium sand, trace gravel, silt. WE
S-3	10-12'	11	19	13	13	0"		No Recovery, spoon WET
S-4	15-17'	5	10	8	11	24"		Brown fine SAND, trace silt. WET
S-5	20-22'	7	9	11	19	23"		Brown fine SAND, little very fine sand, trace coarse sand, silt. WET
S-6	25-27'	10	7	8	12	15"		Brown fine-very fine SAND, trace silt. WET
S-7	30-32'	8	8	13	13	12"		Brown fine-very fine SAND, trace silt. WET
S-8	35-37'	15	11	13	19	11"		Brown fine-very fine SAND, little silt. WET
S-9	40-42'	12	17	18	24	14"		Brown fine-very fine SAND, trace silt. WET
<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> Field Obs. Only <u>Portions Used</u> Trace: 0-10% Little: 10-20% Some: 20-35% And: 35-50% </div> <div style="width: 40%;"> Sump _____ FT. _____ Dia. _____ Screen _____ Ft. _____ Slot _____ Dia. _____ Riser _____ Ft. _____ Dia. _____ Endcaps _____ Expansion Plug _____ </div> <div style="width: 20%;"> Filter Sand _____ Bentonite _____ Bentonite _____ Portland _____ </div> <div style="width: 20%;"> Concrete _____ Flush _____ Stand Up _____ Misc. _____ </div> </div>								

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Well #: 9-08 Start: 8/12/2008 Finish: 8/18/2008
Sheet: 2 of 4
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Loc: _____
Drill/Crew: M.M.

Auger Size 4.25"ID		Casing Size HW		Sampling 5'		Core Barrel		Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks	
		0-6	6-12	12-18	18-24				
S-10	45- 47'	11	7	7	11	15"		0-10"Brown fine-very fine SAND, little silt. 10-15" Brown very fine SAND, some silt, clayey silt in tip. WET	
S-11	50- 52'	12	8	12	19	15"		Brown very fine SAND, some silt. WET	
S-12	55- 57'	9	7	11	20	16"		Brown fine-very fine SAND, some silt, little clay. WET	
S-13	60- 62'	13	15	20	21	10"		Brown fine-very fine SAND, trace silt. WET	
S-14	65- 67'	21	29	31	28	16"		Brown fine-very fine SAND, little silt. WET	
S-15	70- 72'	13	15	26	27	15"		Brown fine-very fine SAND, little silt, clay. WET	
S-16	75- 77'	15	14	14	17	13"		Brown fine-very fine SAND, little silt. WET	
S-17	80- 82'	16	25	31	41	13"		Brown fine-very fine SAND, trace silt, clay. WET	
S-18	85- 87'	9	11	14	19	16"		Brown/Gray very fine SAND, some silt, trace clay. WET (1" clay lens @ 13")	
Field Obs. Only Portions Used Trace: 0-10% Little: 10-20% Some: 20-35% And: 35-50%		Sump _____ FT. _____ Dia. _____ Screen _____ Ft. _____ Slot _____ Dia. _____ Riser _____ Ft. _____ Dia. _____ Endcaps _____ Expansion Plug _____				Filter Sand Bentonite Bentonite _____ Portland _____		Concrete Flush _____ Stand Up _____ Misc. _____	

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Well #: 9-08 Start: 8/12/2008 Finish: 8/18/2008

Sheet: 3 of 4

Client: Tighe & Bond Inspector: J.M.P.

Project: Old Amherst Landfill #: A-0308-7-02

Location: Amherst, MA

Well Locus: _____

Drill/Crew: M.M.

Auger Size 4.25"ID		Casing Size HW		Sampling 5'		Core Barrel		Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks	
		0-6	6-12	12-18	18-24				
S-19	90- 92'	14	15	17	19	11"		Brown/Gray very fine SAND, some silt, trace clay. WET	
S-20	95- 97'	12	14	23	23	13"		Gray very fine SAND and SILT, trace clay. WET	
S-21	100- 102'	14	21	27	37	14"		Gray/Brown very fine SAND, some silt, trace clay. WET	
S-22	105- 107'	10	11	25	42	18"		0-14" Brown very fine SAND, trace silt. 14-18" Brown fine-medium SAND, trace silt, gravel. WET	
S-23	110- 112'	9	17	38	74	16"		0-14" Brown fine SAND, little silt, trace coarse sand, gravel. 14-16" Brown fine SAND, trace medium sand, rock fragments in spoon tip. WET	
S-24	115- 117'	8	11	16	31	19"		Gray very fine SAND, little silt. WET (3" layer very fine sand and coarse sand, fine gravel, little silt @ 12")	
S-25	120- 122'	13	17	25	32	19"		Gray very fine sand, little silt, trace clay, with clay lens throughout . WET	
S-26	125- 127'	10	7	10	9	20"		Gray very fine SAND, little silt. trace clay, with clay lens throughout. WET	
S-27	130- 132	19	31	100		9"		0-5" Red/Gray medium-coarse SAND WET 5-9" Red weathered rock fragments. WET	
Field Obs. Only		Sump _____ FT. _____ Dia. _____				Filter Sand		Concrete	
Portions Used		Screen _____ Ft. _ Slot _ Dia.				Bentonite		Flush _____	
Trace: 0-10%		Riser _ Ft. _ Dia.				Bentonite _____		Stand Up _	
Little: 10-20%		Endcaps _ Expansion Plug				Portland _____		Misc. _____	
Some: 20-35%									
And: 35-50%									

Well #: 9-08 Start: 8/12/2008 Finish: 8/18/2008
Sheet: 4 of 4
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

Tel: (413) 323-8700
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[illegible]

Martin

Geo-Environmental, LLC

Drilling contractors

115 Main Street
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Belchertown, MA 01007

Tel: (413) 323-8700
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Well #: 10-08 Start: 8/18/2008 Finish: 8/20/2008
Sheet: 1 of 3
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

Auger Size 4.25"ID		Casing Size HW		Sampling 5'		Core Barrel	Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks
		0-6	6-12	12-18	18-24			
S-1	0-2'	1	5	8	3	6"		Topsoil, DRY
S-2	5-7'	3	12	12	13	15"		0-4" Topsoil, 4-15" Brown very fine SAND, little silt
S-3	10-12'	8	12	14	15	24"		Brown fine SAND, some very fine sand, trace silt. WET
S-4	15-17'	4	3	3	6	8"		Brown fine SAND, little very fine sand, trace coarse sand. WET
S-5	20-22'	10	9	9	11	11"		Brown fine-very fine SAND, trace coarse sand, silt. WET (2 lens of coarse sand and fine gravel)
S-6	25-27'	11	8	10	11	6"		Gray fine SAND, trace gravel. WET
S-7	30-32'	13	21	27	23	13"		0-5" Gray fine-medium SAND, little gravel, trace coarse sand. 5-13" brown fine SAND, trace very fine sand, silt. WET
S-8	35-37'	28	34	33	37	0"		No Recovery, spoon WET
S-9	40-42'	15	25	36	33	10"		0-4" brown fine-medium SAND, little coarse sand, trace silt. 4-10" brown SILT, little clay. WET
Field Obs. Only		Sump _____ FT. _____ Dia. _____				Filter Sand		Concrete
Portions Used		Screen _____ Ft. _ Slot _ Dia.				Bentonite		Flush _____
Trace: 0-10%		Riser _ Ft. _ Dia.				Bentonite _____		Stand Up _
Little: 10-20%		Endcaps _ Expansion Plug				Portland _____		Misc. _____
Some: 20-35%								
And: 35050%								

Martin

Geo-Environmental, LLC

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P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
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Well #: 10-08 Start: 8/18/2008 Finish: 8/20/2008
Sheet: 2 of 3
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

Auger Size 4.25"ID		Casing Size HW		Sampling 5'		Core Barrel		Utility Clearance #: _____ Town Permit #: _____	
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks	
		0-6	6-12	12-18	18-24				
S-10	45- 47'	22	35	34	36	16"		Gray SILT and CLAY. WET	
S-11	50- 52'	18	33	48	45	16"		0-9" Gray SILT, little clay. 9-16" brown very fine SAND and SILT. WET	
S-12	55- 57'	58	65	87	90	13"		Brown very fine SAND, trace fine sand, gravel. WET	
S-13	60- 62'	70	66	90	72	13"		Brown very fine SAND, little silt, some clay lens. WET	
S-14	65- 67'	50	65	71	67	12"		Brown very fine SAND and SILT, trace clay. WET	
S-15	70- 72'	47	62	69	57	11"		Gray/brown fine-very fine SAND, little silt. WET	
S-16	75- 77'	51	84	73	79	15"		Gray/brown very fine SAND, trace silt. WET	
S-17	80- 82'	10	14	20	43	24"		Brown medium-coarse SAND (WASH) WET	
S-18	85- 87'	14	7	9	19	14"		Gray fine-very fine SAND, little medium sand. WET	
Field Obs. Only		Sump _____ FT. _____ Dia. _____				Filter Sand		Concrete	
Portions Used		Screen _____ Ft. _ Slot _ Dia.				Bentonite		Flush _____	
Trace: 0-10%		Riser _ Ft. _ Dia.				Bentonite _____		Stand Up _	
Little: 10-20%		Endcaps _ Expansion Plug				Portland _____		Misc. _____	
Some: 20-35%									
And: 35050%									

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Well #: 10-08 Start: 8/18/2008 Finish: 8/20/2008
Sheet: 3 of 3
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

[illegible]

Well #: 11-08 Start: 8/21/2008 Finish: 8/21/2008
Sheet: 1 of 1
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

Tel: (413) 323-8700
Fax (413) 323-0200

[illegible]

Martin

Geo-Environmental, LLC

Drilling contractors

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
Fax (413) 323-0200

Well #: 12-08 Start: 8/20/2008 Finish: 8/20/2008
Sheet: 1 of 2
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

Auger Size 4.25"ID		Casing Size HW		Sampling 5'		Core Barrel		Utility Clearance #: _____ Town Permit #: _____					
Sample No.	Depth Range	Blows per 6 "				REC.	Strata Change	Lithology/Remarks					
		0-6	6-12	12-18	18-24								
S-1	0-2'	5	6	7	10	16"		0-2" Topsoil, 2-16" Brown very fine SAND, little silt, trace clay. DRY					
S-2	5-7'	5	5	9	8	20"		Brown very fine SAND and SILT, little clay. WET					
S-3	10-12'	3	3	8	6	16"		Brown very fine SAND and SILT, little clay, fine sand. WET					
S-4	15-17'	2	4	7	8	18"		0-4" gray very fine SAND and SILT, little clay. 4-18" brown very fine SAND and SILT, little clay. WET (2 1" bands of fine-medium sand.)					
S-5	20-22'	16	14	19	24	24"		0-7" brown very fine SAND and SILT, little clay. 7-24" brown fine SAND, little coarse sand, trace gravel. WET					
S-6	25-27'	13	21	17	23	22"		Brown fine SAND, trace gravel. WET					
S-7	30-32'	14	19	20	11	17"		Brown very fine SAND, trace silt. WET					
S-8	35-37'	5	6	6	5	14"		Brown fine SAND, little very fine sand, trace gravel. WET					
S-9	40-42'	23	24	20	18	17"		Brown fine SAND, trace medium sand, very fine sand. WET					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;"> Field Obs. Only Portions Used Trace: 0-10% Little: 10-20% Some: 20-35% And: 35-50% </td> <td style="width: 35%;"> Sump _____ FT. _____ Dia. _____ Screen _____ Ft. _____ Slot _____ Dia. _____ Riser _____ Ft. _____ Dia. _____ Endcaps _____ Expansion Plug _____ </td> <td style="width: 20%;"> Filter Sand Bentonite Bentonite _____ Portland _____ </td> <td style="width: 20%;"> Concrete Flush Stand Up Misc. _____ </td> </tr> </table>										Field Obs. Only Portions Used Trace: 0-10% Little: 10-20% Some: 20-35% And: 35-50%	Sump _____ FT. _____ Dia. _____ Screen _____ Ft. _____ Slot _____ Dia. _____ Riser _____ Ft. _____ Dia. _____ Endcaps _____ Expansion Plug _____	Filter Sand Bentonite Bentonite _____ Portland _____	Concrete Flush Stand Up Misc. _____
Field Obs. Only Portions Used Trace: 0-10% Little: 10-20% Some: 20-35% And: 35-50%	Sump _____ FT. _____ Dia. _____ Screen _____ Ft. _____ Slot _____ Dia. _____ Riser _____ Ft. _____ Dia. _____ Endcaps _____ Expansion Plug _____	Filter Sand Bentonite Bentonite _____ Portland _____	Concrete Flush Stand Up Misc. _____										

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Well #: 12-08 Start: 8/20/2008 Finish: 8/20/2008
Sheet: 2 of 2
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: M.M.

[illegible]

Geo-Environmental, LLC
Drilling contractors

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Tel: (413) 323-8700
Fax (413) 323-0200

Well #: PGW-8 Start: 6/17/2008 Finish: 6/17/2008

Sheet: 1 of 1

Client: Tighe & Bond Inspector: J.M.P.

Project: Old Amherst Landfill #: A-0308-7-02

Location: Amherst, MA

Well Locus: _____

Drill/Crew: J.M.[illegible]

115 Main Street
P.O. Box 646
Belchertown, MA 01007

Well #: PGW-9 Start: 6/18/2008 Finish: 6/18/2008
Sheet: 1 of 1
Client: Tighe & Bond Inspector: J.M.P.
Project: Old Amherst Landfill #: A-0308-7-02
Location: Amherst, MA
Well Locus: _____
Drill/Crew: J.M.

[illegible]

Client: Tighe & Bond				SEABOARD DRILLING, INC.		Test Boring/	
Location: Amherst, MA				P.O. BOX 3026 SPFLD, MA 01101		Monitor Well ID: PGW-1	
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 1 of 2	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/22/2005	
Type	Casing	Sampler	Core Barrel	140/30 300/24		Finish: 9/22/2005	
O.D. Inch	8-1/2"			Rig Type: B-53		Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
0-2'	8-17-15-20	S-1	10"	Brown Very Fine SAND, Trace Silt, Trace Organics, Gravel 0-6".			0.0
5-7'	11-14-17-15	S-2	6"	Light Brown Fine to Medium SAND, Trace Silt and Small Gravel.			0.0
10-12'	9-15-20-29	S-3	10"	Light Brown Fine to Medium SAND, Trace Silt and Small Gravel.			0.0
15-17'	9-15-14-14	S-4	16"	Light Brown Fine to Medium SAND, Trace Silt and Some Small Gravel.			0.0
20-21.5'	9-12-13-17	S-5	17"	Light Brown Fine-Medium SAND, Trace Silt, Trace Small Gravel. 21.5-22' - Light Brown Very Fine SAND and Silt (Moist).			0.0
22-29'	9-10-12-15	S-6	10"	Light Brown Fine-Medium SAND, Trace Silt.			0.0
30-32'	10-12-17-21	S-7	15"	Light Brown Fine-Medium SAND, Trace Silt.			0.0
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence			PROPORTIONS		
# of Hammer Blows	very loose	# of Hammer Blows	very soft /	soft	trace	0 to 10%	
0-4	loose	0-2 3-4	med-stiff /	stiff	little	10 to 20%	
5-9	med/dense	5-8 9-15	very stiff /	hard	some	20 to 35%	
10-29	dense	16-30 31+			and	30 to 50%	
30-49 50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC.		Test Boring/	
Location: Amherst, MA				P.O. BOX 3026 SPFLD, MA 01101		Monitor Well ID: PGW-1	
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 2 of 2	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/22/2005	
Type	Casing	Sampler	Core Barrel	140/30 300/24		Finish: 9/22/2005	
O.D. Inch	8-1/2"			Rig Type: B-53		Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
40-42'	10-12-15-22	S-9	18"	Grey/Light Brown Very Fine SAND and Silt. (Wet).			0.0
45-47'	10-12-13-15	S-10	15"	Brown, Very Fine SAND and Silt (Wet).			0.0
				Well Set @ 45.0'.			
				0.010 Slot Screen 5-45'			
				No. 1 Well SAND 3-45'.			
				Bentonite Seal 1-3'.			
				Concrete 0-1'.			
				Completed with Standpipe Protective Casing.			
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence				PROPORTIONS	
# of Hammer Blows		# of Hammer Blows					
0-4	very loose	0-2	3-4	very soft /	soft	trace	0 to 10%
5-9	loose	5-8	9-15	med-stiff /	stiff	little	10 to 20%
10-29	med/dense	16-30	31+	very stiff /	hard	some	20 to 35%
30-49	dense					and	30 to 50%
50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC.		Test Boring/	
Location: Amherst, MA				P.O. BOX 3026 SPFLD, MA 01101		Monitor Well ID: PGW-2	
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 1 of 2	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/22/2005	
Type	Casing	Sampler	Core Barrel	140/30 300/24		Finish: 9/22/2005	
O.D. Inch	8-1/2"			Rig Type: B-53		Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
0-2'	8-10-10-13	S-1	10"	Brown Very Fine SAND, Trace Silt, Trace Organics.			0.0
5-7'	3-5-5-7	S-2	10"	Light Brown Very Fine SAND, Trace Silt.			0.0
10-12'	8-14-10-10	S-3	6"	Light Brown Very Fine SAND, Trace Silt.			0.0
15-17'	7-14-10-10	S-4	18"	Light Brown Very Fine SAND, Trace Silt.			0.0
20-22'	8-11-12-12	S-5	16"	Light Brown Fine-Medium SAND, Trace Silt.			0.0
25-27'	9-9-11-13	S-6	12"	Light Brown Fine-Medium SAND, Trace Silt.			0.0
30-32'	13-15-16-18	S-7	19"	Light Brown Fine SAND, Trace Silt.			0.0
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence				PROPORTIONS	
# of Hammer Blows	very loose	# of Hammer Blows	very soft /	soft	trace	0 to 10%	
0-4	loose	0-2 3-4	med-stiff /	stiff	little	10 to 20%	
5-9	med/dense	5-8 9-15	very stiff /	hard	some	20 to 35%	
10-29	dense	16-30 31+			and	30 to 50%	
30-49 50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC. P.O. BOX 3026 SPFLD, MA 01101		Test Boring/ Monitor Well ID: PGW-2	
Location: Amherst, MA						Sheet No. 2 of 2	
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Start: 9/22/2005	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30") 140/30 300/24		Finish: 9/22/2005	
Type	Casing HSA	Sampler SS	Core Barrel N/A	Rig Type: B-53		Driller: Frank Harrington	
O.D. Inch	8-1/2"						
I.D. Inch	4-1/4"						
Depth (ft.) Range	Blows Per 6"	Sample No.	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
35-37'	10-12-15-22	S-8	10"	Light Brown/Yellow Very Fine SAND and Trace Silt.			
40-42'	8-9-9-11	S-9	19"	Light Brown, Fine SAND and Trace Silt (Wet).			0.0
45-47'	8-8-9-9	S-10	11"	Brown, Very Fine SAND and Silt.			0.0
				Well Set @ 45.0'.			
				0.010 Slot Screen 5-45' No. 1 Well SAND 3-45'. Bentonite Seal 1-3'. Concrete 0-1'. Completed with Standpipe Protective Casing.			
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler				PROPORTIONS			
Density		Cohesive Consistence					
# of Hammer Blows	very loose	# of Hammer Blows	very soft /	soft	trace	0 to 10%	
0-4	loose	0-2 3-4	med-stiff /	stiff	little	10 to 20%	
5-9	med/dense	5-8 9-15	very stiff /	hard	some	20 to 35%	
10-29	dense	16-30 31+			and	30 to 50%	
30-49 50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC.		Test Boring/	
Location: Amherst, MA				P.O. BOX 3026 SPFLD, MA 01101		Monitor Well ID: PGW-3	
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 1 of 2	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/22/2005	
Type	Casing	Sampler	Core Barrel	140/30 300/24		Finish: 9/22/2005	
O.D. Inch	8-1/2"			Rig Type: B-53		Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
0-2'	13-17-15-15	S-1	6"	Brown Very Fine SAND, Trace Silt, Trace Small Gravel, Trace Organics.			0.0
5-7'	12-18-8-9	S-2	14"	Light Brown Very Fine SAND, Trace Silt and Trace Small Cobbles.			0.0
10-12'	5-5-7-8	S-3	8"	Light Brown Very Fine SAND, Trace Silt.			0.0
15-17'	8-12-9-13	S-4	18"	Light Brown Very Fine SAND, Trace Silt.			0.0
20-22'	10-5-5-4	S-5	20"	Light Brown Very Fine SAND, Trace Silt, Dry.			0.0
25-27'	5-7-7-9	S-6	18"	Light Brown Very Fine SAND, Trace Silt.			0.0
30-32'	16-18-10-8	S-7	10"	Light Brown Very Fine SAND, Trace Silt. (Wet).			0.0
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence				PROPORTIONS	
# of Hammer Blows		very loose	# of Hammer Blows	very soft /	soft	trace	0 to 10%
0-4		loose	0-2 3-4	med-stiff /	stiff	little	10 to 20%
5-9		med/dense	5-8 9-15	very stiff /	hard	some	20 to 35%
10-29		dense	16-30 31+			and	30 to 50%
30-49 50+		very dense					

Client: Tighe & Bond				SEABOARD DRILLING, INC.		Test Boring/	
Location: Amherst, MA				P.O. BOX 3026 SPFLD, MA 01101		Monitor Well ID: PGW-3	
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 2 of 2	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/22/2005	
Type	Casing	Sampler	Core Barrel	140/30 300/24		Finish: 9/22/2005	
O.D. Inch	8-1/2"			Rig Type: B-53		Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
35-37'	8-11-13-10	S-8	24"	Light Brown Very Fine SAND, Trace Silt. (Wet).			0.0
				Well set @ 35.0'.			
				0.010 Slot Screen 5-35'			
				No. 1 Well SAND 3-35'.			
				Bentonite Seal 1-3'.			
				Concrete 0-1'.			
				Completed with Standpipe Protective Casing.			
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence				PROPORTIONS	
# of Hammer Blows		# of Hammer Blows					
0-4	very loose	0-2	3-4	very soft /	soft	trace	0 to 10%
5-9	loose	5-8	9-15	med-stiff /	stiff	little	10 to 20%
10-29	med/dense	16-30	31+	very stiff /	hard	some	20 to 35%
30-49	dense					and	30 to 50%
50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC.		Test Boring/	
Location: Amherst, MA				P.O. BOX 3026 SPFLD, MA 01101		Monitor Well ID: PGW-4	
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 1 of 1	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/23/2005	
Type	Casing	Sampler	Core Barrel	140/30 300/24		Finish: 9/23/2005	
O.D. Inch	8-1/2"			Rig Type: B-53		Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
0-2'	8-9-11-11	S-1	12"	Light Brown Fine SAND, Trace Silt, Trace Small Gravel, Trace Organics.			0.0
5-7'	17-23-24-26	S-2	12"	Light Brown Fine-Medium SAND, Trace Silt.			0.0
10-12'	27-22-18-15	S-3	12"	Light Brown Fine-Medium SAND, Trace Silt, Trace Small Gravel.			0.0
15-17'	8-8-9-11	S-4	18"	Brown Fine-Medium SAND, Trace Silt, Trace Small Gravel (Wet).			0.0
20-22'	10-10-9-10	S-5	15"	Brown Fine-Medium SAND, Trace Silt (Wet).			0.0
				Well Set @ 20.0'.			
				0.010 Slot Screen 5-20'			
				No. 1 Well SAND 3-20'.			
				Bentonite Seal 1-3'.			
				Concrete 0-1'.			
				Completed with Standpipe Protective Casing.			
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence			PROPORTIONS		
# of Hammer Blows		# of Hammer Blows					
0-4	very loose	0-2	3-4	very soft /	soft	trace	0 to 10%
5-9	loose	5-8	9-15	med-stiff /	stiff	little	10 to 20%
10-29	med/dense	16-30	31+	very stiff /	hard	some	20 to 35%
30-49	dense					and	30 to 50%
50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC. P.O. BOX 3026 SPFLD, MA 01101		Test Boring/ Monitor Well ID: PGW-5	
Location Amherst, MA							
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 1 of 2	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/23/2005	
				140/30 300/24		Finish: 9/23/2005	
				Rig Type: B-53		Driller: Frank Harrington	
	Casing	Sampler	Core Barrel				
Type	HSA	SS	N/A				
O.D. Inch	8-1/2"						
I.D. Inch	4-1/4"						
Depth (ft.) Range	Blows Per 6"	Sample No.	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
0-2'	3-7-10-10	S-1	19"	Brown Very Fine SAND, Trace Silt, Trace Organics.			0.0
5-7'	6-6-7-8	S-2	18"	Light Brown Fine SAND, Trace Silt.			0.0
10-12'	5-7-7-9	S-3	12"	Light Brown Fine SAND, Trace Silt.			0.0
15-17'	5-8-9-12	S-4	16"	Light Brown Very Fine SAND, Trace Silt.			0.0
20-22'	5-7-12-18	S-5	12"	Light Brown Fine-Medium SAND, Trace Silt, Trace Small Gravel.			0.0
25-27'	5-8-15-13	S-6	12"	Light Brown Very Fine SAND, Trace Silt.			0.0
30-32'	12-18-18-14	S-7	14"	Light Brown Very Fine SAND, Trace Silt.			0.0
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence				PROPORTIONS	
# of Hammer Blows	very loose	# of Hammer Blows	very soft /	soft	trace	0 to 10%	
0-4	loose	0-2 3-4	med-stiff /	stiff	little	10 to 20%	
5-9	med/dense	5-8 9-15	very stiff /	hard	some	20 to 35%	
10-29	dense	16-30 31+			and	30 to 50%	
30-49 50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC.		Test Boring/	
Location: Amherst, MA				P.O. BOX 3026 SPFLD, MA 01101		Monitor Well ID: PGW-5	
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 2 of 2	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/23/2005	
Type	Casing	Sampler	Core Barrel	140/30 300/24		Finish: 9/23/2005	
O.D. Inch	8-1/2"			Rig Type: B-53		Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
35-37'	10-12-15-14	S-8	14"	Light Brown, Very Fine SAND, Trace Gravel.			0.0
40-42'	10-19-22-24	S-9	11"	Light Brown Fine-Medium SAND, Trace Silt, Trace Small Gravel.			0.0
45-47'	15-18-19-23	S-10	10"	Brown Medium-Coarse SAND, Some Small Gravel (Wet).			0.0
50-52'	18-21-25-17	S-11	8"	Brown, Medium-Coarse SAND, Some Small Gravel (Wet).			0.0
				Well Set @ 50.0'.			
				0.010 Slot Screen 5-50'			
				No. 1 Well SAND 3-50'.			
				Bentonite Seal 1-3'.			
				Concrete 0-1'.			
				Completed with Standpipe Protective Casing.			
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence				PROPORTIONS	
# of Hammer Blows		# of Hammer Blows					
0-4	very loose	0-2	3-4	very soft /	soft	trace	0 to 10%
5-9	loose	5-8	9-15	med-stiff /	stiff	little	10 to 20%
10-29	med/dense	16-30	31+	very stiff /	hard	some	20 to 35%
30-49	dense					and	30 to 50%
50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC. P.O. BOX 3026 SPFLD, MA 01101		Test Boring/ Monitor Well ID: PGW-6	
Location Amherst, MA							
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 1 of 3	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30") 140/30 300/24		Start: 9/26/2005	
Type	Casing HSA	Sampler SS	Core Barrel N/A	Rig Type: B-53		Finish: 9/26/2005	
O.D. Inch	8-1/2"					Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.) Range	Blows Per 6"	Sample No.	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
0-2'	4-8-6-7	S-1	8"	Brown Very Fine SAND, Trace Silt, Trace Organics.			0.0
5-7'	6-5-7-9	S-2	10"	Light Brown Fine to Medium SAND, Trace Silt and Trace Small Gravel.			0.0
10-12'	8-8-7-9	S-3	6"	Light Brown Fine SAND, Trace Silt and Trace Small Gravel.			0.0
15-17'	5-8-10-11	S-4	9"	Light Brown Fine to Medium SAND, Trace Silt and Some Small Gravel.			0.0
20-22'	5-6-6-10	S-5	10"	Light Brown Fine SAND, Trace Silt.			0.0
25-27'	4-5-5-9	S-6	15"	Light Brown Fine-Medium SAND, Trace Silt, Trace Small Gravel.			0.0
30-32'	6-7-9-11	S-7	12"	Light Brown Fine-Medium SAND, Trace Silt, Trace Small Gravel.			0.0
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence			PROPORTIONS		
# of Hammer Blows	very loose	# of Hammer Blows	very soft /	soft	trace	0 to 10%	
0-4	loose	0-2 3-4	med-stiff /	stiff	little	10 to 20%	
5-9	med/dense	5-8 9-15	very stiff /	hard	some	20 to 35%	
10-29	dense	16-30 31+			and	30 to 50%	
30-49 50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC.		Test Boring/	
Location: Amherst, MA				P.O. BOX 3026 SPFLD, MA 01101		Monitor Well ID: PGW-6	
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 2 of 3	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/26/2005	
Type	Casing	Sampler	Core Barrel	140/30 300/24		Finish: 9/26/2005	
O.D. Inch	8-1/2"			Rig Type: B-53		Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
35-37'	10-7-9-12	S-8	12"	Light Brown Fine SAND, Trace Silt, Trace Small Gravel.			0.0
40-42'	9-11-16-15	S-9	12"	Light Brown Very Fine SAND, Trace Silt and Trace Small Gravel.			0.0
45-47'	12-15-17-25	S-10	8"	Light Brown Fine SAND, Trace Silt and Trace Small Gravel.			0.0
50-52'	19-22-30-33	S-11	4"	Light Brown Very Fine SAND, Trace Silt and Trace Small Gravel.			0.0
55-57'	17-20-23-39	S-12	23"	Brown, Very Fine SAND, Trace Silt.			0.0
60-62'	17-19-21-19	S-13	15"	Light Brown Very Fine SAND, Trace Silt.			0.0
65-67'	18-20-17-18	S-14	12"	Light Brown Very Fine SAND, Trace Silt.			0.0
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence			PROPORTIONS		
# of Hammer Blows	very loose	# of Hammer Blows	very soft /	soft	trace	0 to 10%	
0-4	loose	0-2 3-4	med-stiff /	stiff	little	10 to 20%	
5-9	med/dense	5-8 9-15	very stiff /	hard	some	20 to 35%	
10-29	dense	16-30 31+			and	30 to 50%	
30-49 50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC. P.O. BOX 3026 SPFLD, MA 01101 DRILLING/SOIL LOG		Test Boring/ Monitor Well ID: PGW-6	
Location Amherst, MA						Sheet No. 3 of 3	
Project: Old Amherst Landfill				Hammer (Weight-lb./fall-30") 140/30 300/24		Start: 9/23/2005	
Contractor: Seaboard Drilling, Inc.				Rig Type: B-53		Finish: 9/23/2005	
Type		Casing	Sampler	Core Barrel	Driller: Frank Harrington		
O.D. Inch		8-1/2"	SS	N/A			
I.D. Inch		4-1/4"					
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
75-77'	17-19-21-18	S-16	15"	Light Brown, Very Fine SAND, Trace Silt.			0.0
80-82'	15-17-18-23	S-17	19"	Brown Fine SAND, Trace Silt (Wet).			0.0
85-87'	16-18-24-17	S-18	15"	Brown Very Fine SAND and Silt.			0.0
90-92'	19-20-22-23	S-19	12"	Brown Very Fine SAND and Silt.			0.0
				Well Set @ 88.0'. (Total Depth).			
				0.010 Slot Screen 8-88'			
				No. 1 Well SAND 6-88'.			
				Bentonite Seal 4-6'.			
				Concrete 0-1'.			
				Completed with Standpipe Protective Casing.			
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence			PROPORTIONS		
# of Hammer Blows		# of Hammer Blows					
0-4	very loose	0-2	3-4	very soft /	soft	trace	0 to 10%
5-9	loose	5-8	9-15	med-stiff /	stiff	little	10 to 20%
10-29	med/dense	16-30	31+	very stiff /	hard	some	20 to 35%
30-49	dense					and	30 to 50%
50+	very dense						

Client: Tighe & Bond Location: Amherst, MA Project: Old Amherst Landfill Contractor: Seaboard Drilling, Inc.				SEABOARD DRILLING, INC. P.O. BOX 3026 SPFLD, MA 01101 DRILLING/SOIL LOG		Test Boring/ Monitor Well ID: PGW-7	
				Sheet No. 1 of 2		Start: 9/26/2005	
				Finish: 9/26/2005		Driller: Frank Harrington	
	Casing	Sampler	Core Barrel	Hammer (Weight-lb./fall-30") 140/30 300/24			
Type	HSA	SS	N/A	Rig Type: B-53			
O.D. Inch	8-1/2"						
I.D. Inch	4-1/4"						
Depth (ft.)	Blows	Sample	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
Range	Per 6"	No.					
0-2'	8-9-10-9	S-1	8"	Brown Very Fine SAND, Trace Silt, Trace Organics.			0.0
5-7'	7-18-19-22	S-2	6"	Light Brown Very Fine SAND, Trace Silt and Some Small Gravel.			0.0
10-12'	3-3-4-4	S-3	12"	Light Brown Fine SAND, Trace Silt.			0.0
15-17'	4-4-3-5	S-4	2"	Light Brown Fine SAND, Trace Silt.			0.0
20-22'	3-3-4-4	S-5	12"	Light Brown Very Fine SAND, Trace Silt.			0.0
25-27'	3-4-4-4	S-6	14"	Light Brown Very Fine SAND, Trace Silt.			0.0
30-32'	4-5-5-6	S-7	18"	Light Brown Very Fine SAND, Trace Silt.			0.0
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence			PROPORTIONS		
# of Hammer Blows		# of Hammer Blows					
0-4	very loose	0-2	3-4	very soft /	soft	trace	0 to 10%
5-9	loose	5-8	9-15	med-stiff /	stiff	little	10 to 20%
10-29	med/dense	16-30	31+	very stiff /	hard	some	20 to 35%
30-49	dense					and	30 to 50%
50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC. P.O. BOX 3026 SPFLD, MA 01101		Test Boring/ Monitor Well ID: PGW-7	
Location Amherst, MA							
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 2 of 2	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/26/2005	
				140/30 300/24		Finish: 9/26/2005	
				Rig Type: B-53		Driller: Frank Harrington	
	Casing	Sampler	Core Barrel				
Type	HSA	SS	N/A				
O.D. Inch	8-1/2"						
I.D. Inch	4-1/4"						
Depth (ft.) Range	Blows Per 6"	Sample No.	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
35-37'	4-6-5-5	S-8	12"	Light Brown Very Fine SAND, Trace Silt.			0.0
40-42'	3-6-5-4	S-9	14"	Light Brown Very Fine SAND, Trace Silt.			0.0
45-47'	3-4-6-6	S-10	14"	Light Brown Very Fine SAND, Trace Silt.			0.0
50-52'	4-5-3-6	S-11	12"	Light Brown Very Fine SAND, Trace Silt.			0.0
				Well Set @ 50.0'.			
				0.010 Slot Screen 5-50'			
				No. 1 Well SAND 3-50'.			
				Bentonite Seal 1-3'.			
				Concrete 0-1'.			
				Completed with Standpipe Protective Casing.			
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence			PROPORTIONS		
# of Hammer Blows		# of Hammer Blows					
0-4	very loose	0-2	3-4	very soft /	soft	trace	0 to 10%
5-9	loose	5-8	9-15	med-stiff /	stiff	little	10 to 20%
10-29	med/dense	16-30	31+	very stiff /	hard	some	20 to 35%
30-49	dense					and	30 to 50%
50+	very dense						

Client: Tighe & Bond				SEABOARD DRILLING, INC. P.O. BOX 3026 SPFLD, MA 01101		Test Boring/ Monitor Well ID: B-05-0	
Location Amherst, MA							
Project: Old Amherst Landfill				DRILLING/SOIL LOG		Sheet No. 1 of 1	
Contractor: Seaboard Drilling, Inc.				Hammer (Weight-lb./fall-30")		Start: 9/22/2005	
Type	Casing HSA	Sampler SS	Core Barrel N/A	140/30 300/24		Finish: 9/22/2005	
O.D. Inch	8-1/2"			Rig Type: B-53		Driller: Frank Harrington	
I.D. Inch	4-1/4"						
Depth (ft.) Range	Blows Per 6"	Sample No.	Recovery	FIELD CLASSIFICATIONS AND REMARKS			PID
0-2'	5-6-6-8	S-1	10"	Brown Very Fine SAND, Trace Silt, Trace Organics.			0.0
5-7'	9-12-12-10	S-2	11"	Brown, Very Fine SAND, Trace Silt, Trace Small Gravel.			0.0
10-12'	6-6-7-8	S-3	8"	Black, Fine-Medium SAND, Landfill Debris.			0.8
15-17'	10-11-8-9	S-4	8"	Black to Brown Fine-Medium SAND and Landfill Debris.			13.2
20-22'	No Data	S-5	8"	Black, Fine-Medium SAND and Landfill Debris.			6.8
25-27'	15-18-16-13	S-6	0"	No Recovery.			
30-32'	8-12-9-11	S-7	12"	Light Brown to Grey, Very Fine SAND, Trace Silt.			0.3
35-37'	9-8-11-10	S-8	12"	Light Brown, Very Fine SAND, Trace Silt.			0.0
SAMPLE PENETRATION RESISTANCE - 140 lb. Wt. Falling 30" on 2" O.D. sampler							
Density		Cohesive Consistence				PROPORTIONS	
# of Hammer Blows	very loose	# of Hammer Blows	very soft /	soft	trace	0 to 10%	
0-4	loose	0-2 3-4	med-stiff /	stiff	little	10 to 20%	
5-9	med/dense	5-8 9-15	very stiff /	hard	some	20 to 35%	
10-29	dense	16-30 31+			and	30 to 50%	
30-49 50+	very dense						

GeoTesting express

a subsidiary of Geocomp Corporation

1145 Massachusetts Avenue

Boxborough, MA 01719

978 635 0424 Tel

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Transmittal

TO:

Mr. Jason Perry

Tighe & Bond

53 Southampton Road

Westfield, MA 01085

DATE: 1/19/09

GTX NO: 8790

RE: Old Amherst Landfill CSA Project

COPIES	DATE	DESCRIPTION
1	1/19/09	January 2009 Laboratory Test Reports

REMARKS:

SIGNED:

Joe Tomei - Laboratory Manager

CC:

APPROVED BY:

Mark Dobday, P.G. - Laboratory Manager

GeoTesting e x p r e s s

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January 19, 2009

Mr. Jason Perry
Tighe & Bond
53 Southampton Road
Westfield, MA. 01085

Re: Old Amherst Landfill Project (GTX-8790)

Dear Mr. Perry:

Enclosed are the test results you requested for the above referenced project. GeoTesting Express, Inc. (GTX) received 17 soil samples from you on January 9, 2009. These samples were labeled as follows:

Sample	Depth
Well #2-08	80-82 ft
Well #3-08	80-82 ft
Well #4-08	48-50 ft
Well #6-08	25-27 ft
Well #6-08	45-47 ft
Well #6-08	51-53 ft
Well #7-08	10-12 ft
Well #8-08	10-12 ft
Well #9-08	95-97 ft
Well #9-08	125-127 ft
Well #10-08	10-12 ft
Well #10-08	45-47 ft
Well #10-08	85-87 ft
Well #1-08	15-17 ft
Well #12-08	10-12 ft
Well #12-08	45-47 ft
Well #12-08	55-57 ft

GTX performed the following tests on these samples:

- 4 Grain Size Analyses (ASTM D 422) – sieve portion only
- 13 Grain Size Analyses (ASTM D 422) with hydrometer

The hydrometer portion of the analyses was only performed if the sample contained greater than 10% passing the No. 200 sieve.

Copies of your test request forms are attached.

The results presented in this report apply only to the items tested. This report shall not be reproduced except in full, without written approval from GeoTesting Express. The remainder of these samples will be retained for a period of sixty (60) days and will then be discarded unless otherwise notified by you. Please call me if you have

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Boston
Atlanta
New York

www.geocomp.com/geotesting

any questions or require additional information. Thank you for allowing GeoTesting Express the opportunity of providing you with testing services. We look forward to working with you again in the future.

Respectfully yours,

A handwritten signature in black ink, appearing to read "Joe Tomei". The signature is fluid and cursive, with a large initial "J" and a stylized "T".

Joe Tomei

Laboratory Manager

